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Welcome to the new module handbook of your study programme

We are delighted that you have decided to study at the KIT Department of Economics and Management and wish you a good start into the new semester!

The following contact persons are at your disposal for questions and problems at any time.

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D-76133 Karlsruhe
https://www.wiwi.kit.edu/
2 About this handbook

2.1 Notes and rules

The program exists of several subjects (e.g. business administration, economics, operations research). Every subject is split into modules and every module itself consists of one or more interrelated module component exams. The extent of every module is indicated by credit points (CP), which will be credited after the successful completion of the module. Some of the modules are obligatory. According to the interdisciplinary character of the program, a great variety of individual specialization and deepening possibilities exists for a large number of modules. This enables the student to customize content and time schedule of the program according to personal needs, interest and job perspective. The module handbook describes the modules belonging to the program. It describes particularly:

- the structure of the modules
- the extent (in CP)
- the dependencies of the modules,
- the learning outcomes,
- the assessment and examinations.

The module handbook serves as a necessary orientation and as a helpful guide throughout the studies. The module handbook does not replace the course catalog, which provides important information concerning each semester and variable course details (e.g. time and location of the course).

2.1.1 Begin and completion of a module

Each module and each examination can only be selected once. The decision on the assignment of an examination to a module (if, for example, an examination in several modules is selectable) is made by the student at the moment when he / she is registered for the appropriate examination. A module is completed or passed when the module examination is passed (grade 4.0 or better). For modules in which the module examination is carried out over several partial examinations, the following applies: The module is completed when all necessary module partial examinations have been passed. In the case of modules which offer alternative partial examinations, the module examination is concluded with the examination with which the required total credit points are reached or exceeded. The module grade, however, is combined with the weight of the predefined credit points for the module in the overall grade calculation.

2.1.2 Module versions

It is not uncommon for modules to be revised due to, for example, new courses or cancelled examinations. As a rule, a new module version is created, which applies to all students who are new to the module. On the other hand, students who have already started the module enjoy confidence and remain in the old module version. These students can complete the module on the same conditions as at the beginning of the module (exceptions are regulated by the examination committee). The date of the student’s “binding declaration” on the choice of the module in the sense of §5(2) of the Study and Examination Regulation is decisive. This binding declaration is made by registering for the first examination in this module.

In the module handbook, all modules are presented in their current version. The version number is given in the module description. Older module versions can be accessed via the previous module handbooks in the archive at http://www.wiwi.kit.edu/Archiv_MHB.php.

2.1.3 General and partial examinations

Module examinations can be either taken in a general examination or in partial examinations. If the module examination is offered as a general examination, the entire learning content of the module will be examined in a single examination. If the module examination is subdivided into partial examinations, the content of each course will be examined in corresponding partial examinations. Registration for examinations can be done online at the campus management portal. The following functions can be accessed on https://campus.studium.kit.edu/:

- Register/unregister for examinations
- Check for examination results
- Create transcript of records

For further and more detailed information, https://studium.kit.edu/Seiten/FAQ.aspx.

2.1.4 Types of exams

Exams are split into written exams, oral exams and alternative exam assessments. Exams are always graded. Non exam assessments can be repeated several times and are not graded.

2.1.5 Repeating exams

Principally, a failed written exam, oral exam or alternative exam assessment can repeated only once. If the repeat examination (including an eventually provided verbal repeat examination) will be failed as well, the examination claim is lost. A request for a
second repetition has to be made in written form to the examination committee two months after loosing the examination claim. A counseling interview is mandatory.

For further information see http://www.wiwi.kit.edu/hinweiseZweitwdh.php.

2.1.6 Examiners
The examination committee has appointed the KIT examiners and lecturers listed in the module handbook for the modules and their courses as examiners for the courses they offer.

2.1.7 Additional accomplishments
Additional accomplishments are voluntarily taken exams, which have no impact on the overall grade of the student and can take place on the level of single courses or on entire modules. It is also mandatory to declare an additional accomplishment as such at the time of registration for an exam. Additional accomplishments with at most 30 CP may appear additionally in the certificate.

2.1.8 Further information
More detailed information about the legal and general conditions of the program can be found in the examination regulation of the program (http://www.sle.kit.edu/amtlicheBekanntmachungen.php).

2.2 Contact
If you have any questions about modules or exams, please contact the examination office of the KIT Department of Economics and Management:

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   Anabela Relvas
   Telefon +49 721 608-43768
   E-Mail: pruefungssekretariat@wiwi.kit.edu

Editorial responsibility:

   Dr. André Wiesner
   Telefon: +49 721 608-44061
   Email: modul@wiwi.kit.edu
3 Why Industrial Engineering and Management?

The Industrial Engineering and Management study programme is attractive for you if you want to pursue economic and technical interests during your studies. There are three main reasons why graduates have huge job opportunities:

That speaks (among other things) for the course of studies:

- Germany is a high-tech country that depends on innovation. Anyone who wants to take on responsibility in a company here benefits from an interdisciplinary course of study in economics and technology.
- In the digital society, the distinction between technical and business issues is becoming blurred. Industrial engineers understand both and can therefore assume important interface functions.
- Data and data-based decisions are becoming increasingly important in companies and research. The Industrial Engineering and Management study programme has a strong quantitative-methodological orientation and thus prepares students perfectly for these tasks.

You can find more information about the program here:
- https://ranking.zeit.de/de/fachinfo/13

Why Industrial Engineering and Management at KIT? There are some universities in Germany where you can study Industrial Engineering and Management very well. In comparison, studying with us has three important advantages:

- **Flexibility** If you are study Industrial Engineering and Management at KIT, you can tailor your course content to suit your individual needs. At the beginning of your studies, you do not yet decide on a technical subject. First of all, our compulsory courses in the basic programme offer you a broad overview. In the subsequent specialisation programme, you can choose the course content in the technical subjects and economics according to your own interests and goals. Link to the module manual
- **High Informatics share** Digitisation permeates all sectors of the economy and technology. For this reason, Informatics content is particularly anchored in both our basic and advanced programs. As a graduate, you can play an active role in the digital transformation of business and society.
- **Our own faculty** The Industrial Engineering and Management study programme is the core course of studies at the KIT department of Economics. The courses in economics and Informatics are designed for your course of studies and aligned to your interests.

What else speaks for an Industrial Engineering and Management study programme at KIT? These three advantages make the Industrial Engineering and Management study programme at KIT unique. In addition, there are a number of other reasons for studying with us:

- **Top positions in rankings.** In surveys of students and HR managers at companies, our degree programme regularly scores very well.
- **Job opportunities.** After completing their studies with us, students usually quickly find a job that they like.
- **Found your own business.** At KIT you will find an ideal environment for starting your own business. Information on start-up activities at KIT can be found at http://kit-gruenderschmiede.de/de/gruenderschmiede/fuer-studierende/
- **Student activities.** At our faculty and at the KIT, students are committed to themselves and others in a variety of ways. You can find an overview under Student Life at the Department, for example.
- **Sports Offer.** At KIT you will find a wide range of sports activities. Examples are the KIT SC (kitsc.de/ External Link) and the University Sports Programme (www.sport.kit.edu/hochschulsport/ External Link). Campus University. The KIT has a large campus directly in the city centre of Karlsruhe.
4 The Bachelor's degree program in Industrial Engineering and Management

4.1 Qualification objectives of the Bachelor's degree in Industrial Engineering and Management

Graduates of the Bachelor’s degree in Industrial Engineering and Management are equipped with strategically oriented knowledge in economics, engineering sciences, mathematics and information technology acquired during the three-semester core program.

The economics section includes business-related topics from the financial industry, company management, information industry, production management, marketing and accounting as well as economic correlations of microeconomics and macroeconomics.

The math section is divided into mathematics, statistics and operations research. It includes analysis and linear algebra, descriptive and inductive statistics, elementary probability theory and optimization methods.

In the engineering field, the focus is on material and energy balances, material characterization and development, engineering mechanics and electrical engineering.

The technological area is covered by the Applied and Theoretical Computer Science. Through the comprehensive methodological basis, the graduates are in a position to acknowledge and apply specialized basic concepts, methods, models and approaches. They are also able to analyze and review economic and technological structures and processes.

Graduates can independently solve basic engineering calculations and are able to apply important mathematical concepts and methods to solve concrete tasks.

The graduates have deeper knowledge in business administration, economics, computer science, operations research and engineering. Specialization is either done in the field of business administration or engineering depending on one's wishes. Additional knowledge in statistics, law or sociology is also offered depending on one's interests. They are able to react based on this knowledge from the different subjects and disciplines. They thereby largely operate independently in economic, technical and technological topics and survey, analyze, interpret and evaluate the situations systematically.

They are able to classify specialized problems as well as model and choose appropriate methods and procedures for solving the given tasks as well as derive improvement potentials. They know how to validate, illustrate and interpret the achieved results.

This practical use of their know-how also takes into account the social, scientific and ethical aspects.

Graduates of the Bachelor's degree in Industrial Engineering and Management master the basics of project management and are able to assume responsibility in interdisciplinary teams. They are in a position to argue and defend their position both before expert representatives and laypersons.

They have the ability to apply the acquired information on career-related activities in the industry, service sector or in the public management as well as take up a Master's degree program in Industrial Engineering and Management or any other related course.

4.2 Structure of the Bachelor's degree program in Industrial Engineering and Management SPO 2015

The Bachelor’s degree program in Industrial Engineering and Management entails a six-semester standard study period. The basic program in the first three semesters is systematically structured. In the fourth to fifth semesters, a more advanced, specialization program that can be structured depending on one's personal interests and goals is offered.

Figure 2 shows the course and module structure with the respective credit points as well as an example of a possible distribution of modules and courses in the basic program over the semesters, which has proven to be useful.
## Key Skills

### In the basic program (blue), the business administration, economics, informatics, operations research, engineering sciences, statistics and mathematics modules are compulsory. In the 3rd semester, one can choose between Material Transformation and Balances, Engineering Mechanics and Material Science in the engineering basic module.

In the specialization program (green), a module must be selected from each of the following areas: business administration, economics, informatics, operations research and engineering. As part of the mandatory courses, one seminar module (independent of the course) and two modules must be completed. One module can be selected from business administration or engineering subjects and the other from business administration, economics, informatics, operations research, engineering, statistics, law or sociology.

The internship can be completed before or during the Bachelor’s program. The performance record of the completed internship is required for registration for the final module examination in the course.

One is free to structure his/her individual course plan as he/she wishes (taking into account the respective provisions of the study and examination regulations as well as applicable module regulations) and choose the semester he/she wishes to start and/or complete the selected modules. It is however strongly recommended to adhere to the proposal for the first three semesters. The content of the courses is interdisciplinary and coordinated accordingly; the intersection freedom of lectures and examination dates is guaranteed for the recommended study semester.

All modules of the basic and advanced program, including the various alternatives within the module, can be found in this module handbook. Seminars that can be taken up as part of the seminar module are published at the WiWi portal at [https://portal.wiwi.kit.edu/Seminare](https://portal.wiwi.kit.edu/Seminare).

### 4.3 Key Skills

The Bachelor’s degree course in Industrial Engineering and Management at the Department of Economics and Management distinguishes itself by an exceptionally high level of interdisciplinarity. With the combination of business science, economics, informatics, operations research, mathematics as well as engineering and natural science, the integration of knowledge of different disciplines is an inherent element of the programme. As a result, interdisciplinary and connected thinking is encouraged in a natural way. The integrative taught key skills, which are acquired throughout the entire programme, can be classified into the following fields:

**Soft skills**
- Team work, social communication and creativity techniques
- Presentations and presentation techniques
- Logical and systematical arguing and writing
- Structured problem solving and communication

**Enabling skills**
- Decision making in business context
- Project management competences

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<th>Business Administration</th>
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<td>OR 1 4,5 CP</td>
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<td>OR 2 4,5 CP</td>
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Figure 2: Structure of the Bachelor’s degree program in Industrial Engineering and Management SPO 2015 (recommended)

---

**Industrial Engineering and Management B.Sc.**

Module Handbook as of 23.08.2019
Key Skills

Fundamentals of business science
English as a foreign language

Orientational knowledge

- Acquisition of interdisciplinary knowledge
- Institutional knowledge about economic and legal systems
- Knowledge about international organisations
- Media, technology and innovation

The integrative acquisition of key skills especially takes place in several compulsory courses during the bachelor programme, namely

- Basic programme in economics and business science
- Seminar module
- Mentoring of the bachelor thesis
- Internship
- Business science, economics and informatics modules
### 5 Field of study structure

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#### 5.1 Bachelor Thesis

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**Election block: Vertiefungsprogramm Betriebswirtschaftslehre (at least 9 credits)**

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**Election block: Vertiefungsprogramm Volkswirtschaftslehre (at least 9 credits)**

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**Election block: Vertiefungsprogramm Operations Research (1 item)**

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**Election block: Vertiefungsprogramm Ingenieurwissenschaften (at least 9 credits)**

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<td>Introduction to Natural Hazards and Risk Analysis</td>
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**Total Credits:** 21

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**Total Credits:** 10
5 FIELD OF STUDY STRUCTURE

5.10 Compulsory Elective Modules

Credits: 21

Election notes
Within the scope of the elective compulsory area, the seminar module (independent of subject) and two modules are to be taken. One module must be chosen from the subjects Business Administration or Engineering Sciences, the other from the subjects Business Administration, Economics, Informatics, Operations Research, Engineering Sciences, Statistics, Law or Sociology.

Election regulations
Elections in this field must be complete.

### Mandatory

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### Election block: Betriebswirtschaftslehre oder Ingenieurwissenschaften (9 credits)

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**Election block: Betriebswirtschaftslehre (at most 9 credits)**

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<td>Topics in Finance I</td>
<td>9 CR</td>
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<td>M-WIWI-101423</td>
<td>Specialization in Customer Relationship Management</td>
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**Election block: Volkswirtschaftslehre (at most 9 credits)**

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<tr>
<td>M-WIWI-101499</td>
<td>Applied Microeconomics</td>
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<td>M-WIWI-101403</td>
<td>Public Finance</td>
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<td>M-WIWI-101599</td>
<td>Statistics and Econometrics</td>
<td>9 CR</td>
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<td>M-WIWI-101668</td>
<td>Economic Policy I</td>
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<tr>
<td>M-WIWI-101501</td>
<td>Economic Theory</td>
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**Election block: Informatik (at most 9 credits)**

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<td>M-WIWI-101426</td>
<td>Electives in Informatics</td>
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**Election block: Operations Research (at most 9 credits)**

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<td>M-WIWI-101413</td>
<td>Applications of Operations Research</td>
<td>9 CR</td>
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<tr>
<td>M-WIWI-101414</td>
<td>Methodical Foundations of OR</td>
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<td>M-WIWI-103278</td>
<td>Optimization under Uncertainty</td>
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**Election block: Ingenieurwissenschaften (at most 9 credits)**

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<tr>
<td>M-WIWI-101404</td>
<td>Extracurricular Module in Engineering</td>
<td>9 CR</td>
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<tr>
<td>M-MACH-101274</td>
<td>Rail System Technology</td>
<td>9 CR</td>
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<tr>
<td>M-WIWI-104838</td>
<td>Introduction to Natural Hazards and Risk Analysis</td>
<td>9 CR</td>
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<tr>
<td>M-ETIT-102379</td>
<td>Power Network</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-101264</td>
<td>Handling Characteristics of Motor Vehicles</td>
<td>9 CR</td>
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<tr>
<td>M-MACH-101265</td>
<td>Vehicle Development</td>
<td>9 CR</td>
</tr>
<tr>
<td>Course Code</td>
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<td>Credits</td>
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</tr>
<tr>
<td>M-MACH-101266</td>
<td>Automotive Engineering</td>
<td>9 CR</td>
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<tr>
<td>M-MACH-101276</td>
<td>Manufacturing Technology</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-BGU-101004</td>
<td>Fundamentals of Construction</td>
<td>9 CR</td>
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<tr>
<td>M-MACH-101272</td>
<td>Integrated Production Planning</td>
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<tr>
<td>M-MACH-101299</td>
<td>Mechanical Design</td>
<td>9 CR</td>
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<tr>
<td>M-MACH-101277</td>
<td>Material Flow in Logistic Systems</td>
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<tr>
<td>M-MACH-101287</td>
<td>Microsystem Technology</td>
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<td>M-MACH-101267</td>
<td>Mobile Machines</td>
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<td>M-BGU-101067</td>
<td>Mobility and Infrastructure</td>
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<td>M-MACH-101270</td>
<td>Product Lifecycle Management</td>
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<td>M-ETIT-101156</td>
<td>Control Engineering</td>
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<td>M-MACH-101279</td>
<td>Technical Logistics</td>
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<tr>
<td>M-MACH-101275</td>
<td>Combustion Engines I</td>
<td>9 CR</td>
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<tr>
<td>M-MACH-101303</td>
<td>Combustion Engines II</td>
<td>9 CR</td>
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<tr>
<td>M-MACH-101284</td>
<td>Specialization in Production Engineering</td>
<td>9 CR</td>
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<tr>
<td>M-MACH-101261</td>
<td>Emphasis in Fundamentals of Engineering</td>
<td>9 CR</td>
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<tr>
<td>M-MACH-101262</td>
<td>Emphasis Materials Science</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-101286</td>
<td>Machine Tools and Industrial Handling</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101599</td>
<td>Statistics and Econometrics</td>
<td>9 CR</td>
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**Election block: Statistik (at most 9 credits)**
- M-WIWI-101599 Statistics and Econometrics | 9 CR

**Election block: Recht oder Soziologie (at most 9 credits)**
- M-INFO-101187 Elective Module Law | 9 CR
- M-GEISTSOZ-101167 Sociology/Empirical Social Research | 9 CR
6 Modules


**Responsible:**
Prof. Dr.-Ing. Alexander Fidlin  
Dr. Volker Gaukel  
Prof. Dr. Michael Hoffmann

**Organisation:**  
KIT Department of Economics and Management

**Part of:**  
Engineering Sciences (mandatory)

<table>
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<tr>
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**Election block: Wahlpflichtangebot (between 3 and 5 credits)**

<table>
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<tr>
<td>T-MACH-102079</td>
<td>Material Science II for Business Engineers</td>
<td>5</td>
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<tr>
<td>T-MACH-102210</td>
<td>Introduction to Engineering Mechanics II : Dynamics</td>
<td>5</td>
<td>Fidlin</td>
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<tr>
<td>T-CIWVT-106058</td>
<td>Process Fundamentals by the Example of Food Production</td>
<td>3</td>
<td>Gaukel</td>
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<tr>
<td>T-ETIT-100534</td>
<td>Electrical Engineering for Business Engineers, Part II</td>
<td>5</td>
<td>Menesklou</td>
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</tbody>
</table>

**Competence Certificate**
See course description.

**Competence Goal**
See German version.

**Prerequisites**
None

**Content**
The module focuses on basic engineering topics related to materials science, engineering mechanics and food processing.

**Annotation**
The course T-ETIT-100534 "Electrical Engineering for Business Engineers, Part II" is only offered temporarily in the module. It should be pointed out that "Material Science II for Business Engineers" and "Electrical Engineering for Business Engineers, Part II" are not offered in winter term, but only in summer term.

**Workload**
The total workload for this module is approximately 90 hours.

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: Operations Research (Vertiefungsprogramm Operations Research)
Compulsory Elective Modules (Operations Research)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Recurrence</th>
<th>Duration</th>
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<td>1 semester</td>
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Election block: Wahlpflichtangebot (between 1 and 2 items)

<table>
<thead>
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<th>Credits</th>
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<th>Instructor</th>
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<tbody>
<tr>
<td>T-WIWI-102704</td>
<td>Facility Location and Strategic Supply Chain Management</td>
<td>4.5</td>
<td>CR</td>
<td>Nickel</td>
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<tr>
<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management</td>
<td>4.5</td>
<td>CR</td>
<td>Nickel</td>
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Election block: Ergänzungsangebot (at most 1 item)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>CR</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>T-WIWI-102726</td>
<td>Global Optimization I</td>
<td>4.5</td>
<td>CR</td>
<td>Stein</td>
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<tr>
<td>T-WIWI-106199</td>
<td>Modeling and OR-Software: Introduction</td>
<td>4.5</td>
<td>CR</td>
<td>Nickel</td>
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<tr>
<td>T-WIWI-106545</td>
<td>Optimization under Uncertainty</td>
<td>4.5</td>
<td>CR</td>
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</table>

Competence Certificate
Due to a research semester of Professor Nickel in WS 19/20, the events Location Planning and Strategic SCM and Practice Seminar: Health Care Management do NOT take place in WS 19/20. Please also refer to the information at https://doli.or.kit.edu/Lehrveranstaltungen.php for further details.

The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student

- is familiar with basic concepts and terms of Supply Chain Management,
- knows the different areas of Supply Chain Management and their respective optimization problems,
- is acquainted with classical location problem models (in the plane, on networks and discrete) as well as fundamental methods for distribution and transport planning, inventory planning and management,
- is able to model practical problems mathematically and estimate their complexity as well as choose and adapt appropriate solution methods.

Prerequisites
At least one of the courses Facility Location and strategic Supply Chain Management and Tactical and operational Supply Chain Management has to be taken.

Content
Supply Chain Management is concerned with the planning and optimization of the entire, inter-company procurement, production and distribution process for several products taking place between different business partners (suppliers, logistics service providers, dealers). The main goal is to minimize the overall costs while taking into account several constraints including the satisfaction of customer demands.

This module considers several areas of Supply Chain Management. On the one hand, the determination of optimal locations within a supply chain is addressed. Strategic decisions concerning the location of facilities like production plants, distribution centers or warehouses are of high importance for the rentability of supply chains. Thoroughly carried out, location planning tasks allow an efficient flow of materials and lead to lower costs and increased customer service. On the other hand, the planning of material transport in the context of Supply Chain Management represents another focus of this module. By linking transport connections and different facilities, the material source (production plant) is connected with the material sink (customer). For given material flows or shipments, it is considered how to choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints.

Furthermore, this module offers the possibility to learn about different aspects of the tactical and operational planning level in Supply Chain Management, including methods of scheduling as well as different approaches in procurement and distribution logistics. Finally, issues of warehousing and inventory management will be discussed.
**Recommendation**
The courses Introduction to Operations Research I and II are helpful.

**Annotation**
The planned lectures and courses for the next three years are announced online.

**Workload**
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
6.3 Module: Applied Informatics [M-WIWI-105112]

**Responsible:** Prof. Dr. Andreas Oberweis  
Prof. Dr. Ali Sunyaev  
Prof. Dr. York Sure-Vetter  
Prof. Dr. Melanie Volkamer

**Organisation:** KIT Department of Economics and Management  
**Part of:** Informatics (Vertiefungsprogramm Informatik)

<table>
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<tbody>
<tr>
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<td>Each term</td>
<td>1 semester</td>
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**Election block: Programmierung kommerzieller Systeme (1 item)**

<table>
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<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Responsible</th>
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<tbody>
<tr>
<td>T-WIWI-102747</td>
<td>Advanced Programming - Java Network Programming</td>
<td>4.5</td>
<td>Ratz</td>
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<tr>
<td>T-WIWI-102748</td>
<td>Advanced Programming - Application of Business Software</td>
<td>4.5</td>
<td>Klink, Oberweis</td>
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**Election block: Ergänzungsangebot (1 item)**

<table>
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<tr>
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<th>Course Title</th>
<th>Credits</th>
<th>Responsible</th>
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<tbody>
<tr>
<td>T-WIWI-110340</td>
<td>Applied Informatics – Applications of Artificial Intelligence</td>
<td>4.5</td>
<td>Sure-Vetter</td>
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<tr>
<td>T-WIWI-110341</td>
<td>Applied Informatics – Database Systems</td>
<td>4.5</td>
<td>Oberweis</td>
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<tr>
<td>T-WIWI-110342</td>
<td>Applied Informatics – Information Security</td>
<td>4.5</td>
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<td>T-WIWI-110338</td>
<td>Applied Informatics – Modelling</td>
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<td>Oberweis, Sure-Vetter</td>
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<td>T-WIWI-110343</td>
<td>Applied Informatics – Software Engineering</td>
<td>4.5</td>
<td>Oberweis</td>
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**Competence Certificate**

The assessment is carried out as two partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

- Partial exam I: *Advanced Programming - Java Network Programming* or alternatively *Advanced Programming - Application of Business Software*
- Partial exam II: all the rest

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- has the capability of dealing with the practical application of the Java programming language (which is the dominating programming language in many application areas) or alternatively the ability to configure, parameterize and deploy enterprise software to enable, support and automate business processes,
- knows in depth methods and systems of a core area or a core application area of Informatics according to the contents dealt with in the lectures,
- can choose these methods and system situation adequately and can furthermore design and employ them for problem solving,
- is able to independently find strategic and creative answers in the finding of solutions to well defined, concrete, and abstract problems.

**Content**

In this module, object-oriented programming skills using the Java programming language are further deepened. Alternatively important fundamentals of business information systems are conveyed that enable, support and accelerate new forms of business processes and organizational forms. Based on a core application area, basic methods and techniques of computer science are presented.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Applied Microeconomics [M-WIWI-101499]

**Responsible:** Prof. Dr. Johannes Philipp Reiß

**Organisation:** KIT Department of Economics and Management

**Part of:** Economics (Vertiefungsprogramm Volkswirtschaftslehre)

**Compulsory Elective Modules (Volkswirtschaftslehre)**

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**Election block: Wahlpflichtangebot (at least 9 credits)**

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<td>Auction &amp; Mechanism Design</td>
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<tr>
<td>T-WIWI-102892</td>
<td>Economics and Behavior</td>
<td>4.5</td>
<td>Szech</td>
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<tr>
<td>T-WIWI-102850</td>
<td>Introduction to Game Theory</td>
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<td>Puppe, Reiß</td>
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<td>T-WIWI-102792</td>
<td>Decision Theory</td>
<td>4.5</td>
<td>Ehrhart</td>
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<td>T-WIWI-102844</td>
<td>Industrial Organization</td>
<td>4.5</td>
<td>Reiß</td>
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<td>Public Revenues</td>
<td>4.5</td>
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<td>Economics III: Introduction in Econometrics</td>
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<tr>
<td>T-WIWI-100005</td>
<td>Competition in Networks</td>
<td>4.5</td>
<td>Mitsuch</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

Students

- are introduced to the basic theoretical analysis of strategic interaction situations and shall be able to analyze situations of strategic interaction systematically and to use game theory to predict outcomes and give advice in applied economics settings, (course "Introduction to Game Theory");
- are exposed to the basic problems of imperfect competition and its implications for policy making; (course "Industrial Organization");
- are provided with the basic economics of network industries (e.g., telecom, utilities, IT, and transport sectors) and should get a vivid idea of the special characteristics of network industries concerning planning, competition, competitive distortion, and state intervention, (course "Competition in Networks").

**Prerequisites**

None.

**Content**

The module’s purpose is to extend and foster skills in microeconomic theory by investigating a variety of applications. Students shall be able to analyze real-life problems using microeconomics.

**Recommendation**

Completion of the module Economics is assumed.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
6.5 Module: Automotive Engineering [M-MACH-101266]

**Responsible:** Prof. Dr. Frank Gauterin  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)  
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
- Compulsory Elective Modules (Ingenieurwissenschaften)

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<th>Level</th>
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<tr>
<td>T-MACH-100092</td>
<td>Automotive Engineering I</td>
<td>6 CR</td>
<td>Gauterin, Unrau</td>
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<tr>
<td>T-MACH-102117</td>
<td>Automotive Engineering II</td>
<td>3 CR</td>
<td>Gauterin, Unrau</td>
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<tr>
<td>T-MACH-102156</td>
<td>Project Workshop: Automotive Engineering</td>
<td>4.5 CR</td>
<td>Frey, Gauterin, Gießler</td>
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<tr>
<td>T-MACH-102116</td>
<td>Fundamentals for Design of Motor-Vehicle Bodies I</td>
<td>1.5 CR</td>
<td>Bardehle</td>
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<tr>
<td>T-MACH-102119</td>
<td>Fundamentals for Design of Motor-Vehicle Bodies II</td>
<td>1.5 CR</td>
<td>Bardehle</td>
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<td>T-MACH-102093</td>
<td>Fluid Power Systems</td>
<td>5 CR</td>
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<td>T-MACH-102150</td>
<td>BUS-Controls</td>
<td>3 CR</td>
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<td>T-MACH-108889</td>
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<td>0 CR</td>
<td>Daiß, Geimer</td>
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<td>Automotive Engineering I</td>
<td>6 CR</td>
<td>Gauterin, Gießler</td>
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**Compensation Certificate**

The assessment is carried out as partial exams (according to Section 4(2)), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- knows the most important components of a vehicle,
- knows and understands the functioning and the interaction of the individual components,
- knows the basics of dimensioning the components.

**Prerequisites**

None

**Content**

In the module Automotive Engineering the basics are taught, which are important for the development, the design, the production and the operation of vehicles. Particularly the primary important aggregates like engine, gear, drive train, chasis and auxiliary equipment are explained, but also all technical equipment, which make the operation safer and easier. Additionally the interior equipment is examined, which shall provide a preferably comfortable, optimum ambience to the user.

In the module Automotive Engineering the focus is on passenger cars and commercial vehicles, which are designed for road applications.

**Recommendation**


**Workload**

The total work load for this module is about 270 Hours (9 Credits). The partition of the work load is carried out according to the credit points of the courses of the module. The work load for courses with 6 credit points is about 180 hours, for courses with 4.5 credit points about 135 hours, for courses with 3 credit points about 90 hours, and for courses with 1.5 credit points about 45 hours. The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam duration and the time that is required to achieve the objectives of the module as an average student with an average performance.
Learning type
The teaching and learning procedures (lecture, lab course, workshop) are described for each course of the module separately.
Module: Combustion Engines I [M-MACH-101275]

**Responsible:** Prof. Dr. Thomas Koch  
Dr.-Ing. Heiko Kubach

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)  
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
Compulsory Elective Modules (Ingenieurwissenschaften)

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**Election block: Wahlpflicht (between 1 and 2 items)**

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<tr>
<td>T-MACH-102194</td>
<td>Combustion Engines I</td>
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<tr>
<td>T-MACH-105564</td>
<td>Energy Conversion and Increased Efficiency in Internal Combustion Engines</td>
<td>4 CR</td>
<td>Koch, Kubach</td>
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</table>

**Competence Certificate**
The module examination contains of two oral examinations. The module score results from the two scores weighted according to the ECTS.

**Competence Goal**
The student can name and explain the working principle of combustion engines. He is able to analyse and evaluate the combustion process. He is able to evaluate influences of gas exchange, mixture formation, fuels and exhaust gas aftertreatment on the combustion performance. He can solve basic research problems in the field of engine development.

The student can name all important influences on the combustion process. He can analyse and evaluate the engine process considering efficiency, emissions and potential.

**Prerequisites**
None

**Content**
Working Principle of ICE  
Characteristic Parameters  
Characteristic parameters  
Engine parts  
Crank drive  
Fuels  
Gasoline engine operation modes  
Diesel engine operation modes  
Emissions  
Fundamentals of ICE combustion  
Thermodynamics of ICE  
Flow field  
Wall heat losses  
Combustion in Gasoline and Diesel engines  
Heat release calculation  
Waste heat recovery

**Workload**
regular attendance: 62 hours  
self-study: 208 hours
Module: Combustion Engines II [M-MACH-101303]

**Responsible:** Dr.-Ing. Heiko Kubach  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)  
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
Compulsory Elective Modules (Ingenieurwissenschaften)

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<tr>
<td>T-MACH-104609</td>
<td>Combustion Engines II</td>
<td>5 CR Koch, Kubach</td>
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**Election block: Verbrennungsmotoren II (at least 4 credits)**

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<tr>
<td>T-MACH-105044</td>
<td>Fundamentals of Catalytic Exhaust Gas Aftertreatment</td>
<td>4 CR Deutschmann, Grunwaldt, Kubach, Lox</td>
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<tr>
<td>T-MACH-105173</td>
<td>Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines</td>
<td>4 CR Gohl</td>
</tr>
<tr>
<td>T-MACH-105184</td>
<td>Fuels and Lubricants for Combustion Engines</td>
<td>4 CR Kehrwald, Kubach</td>
</tr>
<tr>
<td>T-MACH-105167</td>
<td>Analysis Tools for Combustion Diagnostics</td>
<td>4 CR Pfeil</td>
</tr>
<tr>
<td>T-MACH-102197</td>
<td>Gas Engines</td>
<td>4 CR Golloch, Kubach</td>
</tr>
<tr>
<td>T-MACH-102199</td>
<td>Model Based Application Methods</td>
<td>4 CR Kirschbaum</td>
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<tr>
<td>T-MACH-105169</td>
<td>Engine Measurement Techniques</td>
<td>4 CR Bernhardt</td>
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**Competence Certificate**
The assessment consists of an oral exam (60 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Reexaminations are offered at every ordinary examination date.

**Competence Goal**
See courses.

**Prerequisites**
It is only possible to choose this module in combination with the module Combustion Engines I. The module is passed only after the final partial exam of Combustion Engines I is additionally passed.

The course Combustion Engines II [2134131] has to be attended.

**Content**

**Compulsory:**
- Supercharging and air management
- Engine maps
- Emissions and Exhaust gas aftertreatment
- Transient engine operation
- ECU application
- Electrification and alternative powertrains

**Elective:**
- Fuels and lubricants for ICE
- Fundamentals of catalytic EGA
- Analysis tools for combustion diagnostics
- Engine measurement techniques
- Analysis of Exhaust Gas und Lubricating Oil in Combustion Engines

**Workload**
- regular attendance: 62 h
- self-study: 208 h
Module: Control Engineering [M-ETIT-101156]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann  
Dr.-Ing. Mathias Kluwe

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)  
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
Compulsory Elective Modules (Ingenieurwissenschaften)

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<tr>
<td>T-ETIT-100699</td>
<td>Modelling and Identification</td>
<td>4</td>
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<td>4 CR</td>
<td>Hohmann</td>
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<tr>
<td>T-ETIT-101921</td>
<td>System Dynamics and Control Engineering</td>
<td>6</td>
<td>Each term</td>
<td>6 CR</td>
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**Competence Goal**

The students
- get familiar with the basic concepts of control theory,
- learn and understand the elements, the structure and the behavior of dynamic systems,
- have insight in the problems of control and intuition about methods available to solve those problems as well in frequency domain as in time domain,
- get familiar with the basic principles and methods for the theoretical and experimental modelling of dynamic systems.

**Prerequisites**
Successful passing of the corresponding modules of the basic program.

**Content**
This module familiarizes students with the basic elements, structures and the behavior of dynamic systems. Both time continuous and time discrete models are regarded. The students gain insight into the problems of control design and methods available to solve such problems in frequency and time domain. Above that, the students learn the basic principles and methods for the theoretical and experimental modelling of dynamic systems.
6.9 Module: CRM and Service Management [M-WIWI-101460]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organization: KIT Department of Economics and Management
Part of: Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre) (Usage until 3/31/2020)
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
Compulsory Elective Modules (Betriebswirtschaftslehre) (Usage until 3/31/2020)

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Election block: Wahlpflichtangebot (2 items)

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<th>4,5 CR</th>
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<tr>
<td>T-WIWI-102597</td>
<td>Operative CRM</td>
<td>4,5 CR</td>
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</table>

Competence Certificate
This module will be offered for the last time in winter semester 2019/20.
The assessment is carried out as partial exams (according to § 4 (1) S. 2 2nd clause of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student
- understands service management as the managerial foundation of customer relationship management and the resulting implications for strategic management, the organisational structure, and the functional areas of the company,
- develops and designs service concepts and service systems on a conceptual level,
- works in teams on case studies and respects project dates, integrates international literature of the discipline,
- knows the current developments in CRM in science as well as in industry,
- knows the scientific methods (from business administration, statistics, informatics) which are most relevant for analytic CRM and he autonomously applies these methods to standard cases,
- designs, implements, and analyzes operative CRM processes in concrete application domains (e.g. campaign management, call center management, ...).

Prerequisites
None

Content
In the module CRM and Service Management we teach the principles of modern customer-oriented management and its support by system architectures and CRM software packages. Choosing customer relationship management as a company's strategy requires service management and a strict implementation of service management in all parts of the company.

For operative CRM we present the design of customer-oriented, IT-supported business processes based on business process modelling and we explain these processes in concrete application scenarios (e.g. marketing campaign management, call center management, sales force management, field services, ...).

Analytic CRM is dedicated to improve the use of knowledge about customers in the broadest sense for decision-making (e.g. product-mix decisions, bonus programs based on customer loyalty, ...) and for the improvement of services. A requirement for this is the tight integration of operative systems with a data warehouse, the development of customer-oriented and flexible reporting systems, and – last but not least – the application of statistical methods (clustering, regression, stochastic models, ...).

Annotation
The lecture Customer Relationship Management [2540508] is given in English.

Workload
The total amount of work for this module is approximately 270 hours (9 credits). The subdivision is based on the credits of the courses of the module.
The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam periods and the time that is required to achieve the objectives of the module as an average student with an average performance.
6.10 Module: Design, Construction and Sustainability Assessment of Buildings [M-WIWI-101467]

Responsible: Prof. Dr.-Ing. Thomas Lützkendorf
Organisation: KIT Department of Economics and Management
Part of: Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
Compulsory Elective Modules (Betriebswirtschaftslehre)

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<td>T-WIWI-102742</td>
<td>Design, Construction and Sustainability Assessment of Buildings I</td>
<td>4,5 CR</td>
<td>Each term</td>
<td>2 semester</td>
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<td>Lützkendorf</td>
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<tr>
<td>T-WIWI-102743</td>
<td>Design, Construction and Sustainability Assessment of Buildings II</td>
<td>4,5 CR</td>
<td>Each term</td>
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<td>Lützkendorf</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student

- knows the basics of sustainable design, construction and operation of buildings with an emphasis on building ecology
- has knowledge of building ecology assessment procedures and tools for design and assessment
- is capable of applying this knowledge to assessing the ecological advantageousness of buildings as well as their contribution to a sustainable development.

Prerequisites
None

Content
Sustainable design, construction and operation of buildings currently are predominant topics of the real estate sector, as well as "green buildings". Not only designers and civil engineers, but also other actors who are concerned with project development, financing and insurance of buildings or portfolio management are interested in these topics.

On the one hand the courses included in this module cover the basics of energy-efficient, resource-saving and health-supporting design and construction of buildings. On the other hand fundamental assessment procedures for analysing and communicating the ecological advantageousness of technical solutions are discussed. With the basics of green building certification systems the lectures provide presently strongly demanded knowledge.

Additionally, videos and simulation tools are used for providing a better understanding of the content of teaching.

Recommendation
The combination with the module Real Estate Management is recommended.

Furthermore a combination with courses in the area of

- Industrial production (energy flow in the economy, energy politics, emissions)
- Civil engineering and architecture (building physics, building construction)

is recommended.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
6.11 Module: eBusiness and Service Management [M-WIWI-101434]

**Responsible:** Prof. Dr. Christof Weinhardt  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)  
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
- Compulsory Elective Modules (Betriebswirtschaftslehre)

### Election block: Wahlpflichtangebot (9 credits)

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<td>T-WIWI-109941</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>4,5 CR</td>
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<td>Foundations of Interactive Systems</td>
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### Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

### Competence Goal

The students

- understand the strategic and operative design of information and information products,
- analyze the role of information on markets,
- evaluate case studies regarding information products,
- develop solutions in teams.

### Prerequisites

None

### Content

This module gives an overview of the mutual dependencies of strategic management and information systems. The central role of information is exemplified by the structuring concept of the information life cycle.

The single phases of this life cycle from generation over allocation until dissemination and use of the information are analyzed from a business and microeconomic perspective, applying classical and new theories. The state of the art of economic theory on aspects of the information life cycle are presented. The lecture is complemented by exercise courses. The courses “Platform Economy”, “eFinance: Information systems in finance” and “eServices” constitute three different application domains in which the basic principles of the Internet Economy are deepened. In the core lecture “Platform Economy” the focus is set on markets between two parties that act through an intermediary on an Internet platform. Topics discussed are network effects, peer-to-peer markets, blockchains and marketdesign. The course is held in English and teaches parts of the syllabus with the support of a case study in which students analyze a platform.

The course “eFinance: information systems for securities trading” provides theoretically profound and also practical-oriented background about the functioning of international financial markets. The focus is placed on the economic and technical design of markets as information processing systems.

In “eServices” the increasing impact of electronic services compared to the traditional services is outlined. The Information- und Communication Technologies enable the provision of services, which are mainly characterized by interactivity and individuality. This course provides basic knowledge about the development and management of ICT-based services.

The theoretic fundamentals of Information systems can be enriched by a practical experience in Special Topics in Information Engineering and Management. Any practical Seminar at the IM can be chosen for the course Special Topics in Information systems.
Annotation
All practical Seminars offered at the IM can be chosen for Special Topics in Information Systems. Please update yourself on www.iism.kit.edu/im/lehre

Workload
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: Economics (Vertiefungsprogramm Volkswirtschaftslehre)
Compulsory Elective Modules (Volkswirtschaftslehre)

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Election block: Wahlpflichtangebot (1 item)

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<td>T-WIWI-102739</td>
<td>Public Revenues</td>
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<td>4,5</td>
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<td>4,5</td>
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Competence Certificate

The module examination takes place in the form of examinations (§4(2),1 SPO) of the selected partial module performance. The examination is carried out separately for each partial module and is described there. It is possible to repeat examinations at any regular examination date.

The grades of the partial module correspond to the grades of the passed examinations. The overall grade of the module is formed from the grades of the partial performances weighted with LP.

Competence Goal

Students shall be given the ability to

- understand and deepen basic concepts of micro- and macroeconomic theories
- apply those theories to economic policy issues
- understand government interventions in the market and their legitimation from the perspective of economic welfare
- learn how theory-based policy recommendations are derived

Prerequisites

None.

Content

- Intervention in the market: micro-economic perspective
- Intervention in the market: macroeconomic perspective
- Institutional economic aspects
- Economic policy and welfare economics
- Carriers of economic policy: political-economic aspects

Recommendation

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2610012], and Economics II [2600014].

Workload

Total effort for 9 credit points: approx. 270 hours. The distribution is made according to the credit points of the courses of the module.
### 6.13 Module: Economic Theory [M-WIWI-101501]

**Responsible:** Prof. Dr. Clemens Puppe  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Economics (Vertiefungsprogramm Volkswirtschaftslehre)  
**Compulsory Elective Modules (Volkswirtschaftslehre)**

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#### Election block: Wahlpflichtangebot (9 credits)

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<td>Advanced Topics in Economic Theory</td>
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<tr>
<td>T-WIWI-102876</td>
<td>Auction &amp; Mechanism Design</td>
<td>4,5 CR</td>
<td>Szech</td>
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<tr>
<td>T-WIWI-102892</td>
<td>Economics and Behavior</td>
<td>4,5 CR</td>
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<td>Introduction to Game Theory</td>
<td>4,5 CR</td>
<td>Puppe, Reiß</td>
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<td>T-WIWI-102610</td>
<td>Welfare Economics</td>
<td>4,5 CR</td>
<td>Puppe</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

See German version.

**Prerequisites**

None

**Content**

The lecture Introduction to Game Theory focuses on the basics of non-cooperative game theory. Model assumptions, solution concepts and applications are discussed in detail both for simultaneous games (normal form games) and for sequential games (extensive form games). Classical equilibrium concepts like the Nash equilibrium or the subgame perfect equilibrium, but also advanced concepts will be discussed in detail. If necessary, a brief insight into cooperative game theory will also be given.

The course Auction & Mechanism Design starts with the basic theory of equilibrium behavior and yield management in single object standard auctions. After introducing the yield equivalence theorem for standard auctions, the focus shifts to mechanism design and its applications for single-object auctions and bilateral exchanges.

The course Economics and Behavior introduces fundamental topics of behavioural economics in terms of content and methodology. Students will also gain insight into the design of economic experimental studies. Students will also be introduced to the reading of and critical examination of current research in behavioural economics.

**Recommendation**

None

**Annotation**

The course T-WIWI-102609 - Advanced Topics in Economic Theory is currently not available.
6.14 Module: eFinance [M-WIWI-101402]

**Responsibility:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre)

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<th>eFinance: Information Systems for Securities Trading</th>
<th>4.5 CR</th>
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<tr>
<td>T-WIWI-102643</td>
<td>Derivatives</td>
<td>4.5 CR</td>
<td>Uhrig-Homburg</td>
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<tr>
<td>T-WIWI-102646</td>
<td>International Finance</td>
<td>3 CR</td>
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**Elective Block:**

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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The students

- are able to understand and analyse the value creation chain in stock broking,
- are able to adequately identify, design and use methods and systems to solve problems in finance,
- are able to evaluate and criticize investment decisions by traders,
- are able to apply theoretical methods of econometrics,
- learn to elaborate solutions in a team.

**Prerequisites**
The course *eFinance: Information Systems for Securities Trading* [2540454] is compulsory and must be examined.

**Content**
The module "eFinance: Information engineering and management in finance" addresses current problems in the finance sector. It is investigated the role of information and knowledge in the finance sector and how information systems can solve or extenuate them. Speakers from practice will contribute to lectures with their broad knowledge. Core courses of the module deal with the background of banks and insurance companies and the electronic commerce of stocks in global finance markets. In addition the course Derivatives offers an insight into future and forward contracts as well as the assessment of options. Exchanges and International Finance are also alternatives which provide a supplementary understanding for capital markets.

Information management topics are in the focus of the lecture "eFinance: information engineering and management for securities trading". For the functioning of the international finance markets, it is necessary that there is an efficient information flow. Also, the regulatory frameworks play an important role. In this context, the role and the functioning of (electronic) stock markets, online brokers and other finance intermediaries and their platforms are presented. Not only IT concepts of German finance intermediaries are presented, but also international system approaches will be compared. The lecture is supplemented by speakers from the practice (and excursions, if possible) coming from the Deutsche Börse and the Stuttgart Stock Exchange.

**Annotation**
The current seminar courses for this semester, which are complementary to this module, are listed on following webpage: the [http://www.iism.kit.edu/im/lehre](http://www.iism.kit.edu/im/lehre)

**Workload**
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
6.15 Module: Elective Module Law [M-INF-101187]

**Responsible:** Prof. Dr. Thomas Dreier

**Organisation:** KIT Department of Informatics

**Part of:** Compulsory Elective Modules (Recht oder Soziologie)

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<th>Level</th>
<th>Version</th>
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<td>3 CR</td>
<td>Marsch</td>
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<td>T-INFO-102042</td>
<td>Public Law II - Public Business Law</td>
<td>3 CR</td>
<td>Marsch</td>
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<td>T-INFO-103339</td>
<td>Civil Law for Beginners</td>
<td>4 CR</td>
<td>Dreier</td>
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**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place in every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

None

**Workload**

See German version.
Module: Electives in Informatics [M-WIWI-101426]

**Responsibility:**
- Prof. Dr. Andreas Oberweis
- Prof. Dr. Ali Sunyaev
- Prof. Dr. York Sure-Vetter
- Prof. Dr. Melanie Volkamer

**Organisation:**
KIT Department of Economics and Management

**Part of:**
Compulsory Elective Modules (Informatik)

**Credits:** 9
**Recurrence:** Each term
**Duration:** 1 semester
**Level:** 3
**Version:** 10

### Election block: Wahlpflichtangebot (between 1 and 2 items)

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<tr>
<td>T-WIWI-110340</td>
<td>Applied Informatics – Applications of Artificial Intelligence</td>
<td>4,5 CR</td>
<td>Sure-Vetter</td>
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<tr>
<td>T-WIWI-110341</td>
<td>Applied Informatics – Database Systems</td>
<td>4,5 CR</td>
<td>Oberweis</td>
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<tr>
<td>T-WIWI-110342</td>
<td>Applied Informatics – Information Security</td>
<td>4,5 CR</td>
<td>Volkamer</td>
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<tr>
<td>T-WIWI-110338</td>
<td>Applied Informatics – Modelling</td>
<td>4,5 CR</td>
<td>Oberweis, Sure-Vetter</td>
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<tr>
<td>T-WIWI-110343</td>
<td>Applied Informatics – Software Engineering</td>
<td>4,5 CR</td>
<td>Oberweis</td>
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<tr>
<td>T-WIWI-104679</td>
<td>Foundations of Mobile Business</td>
<td>4,5 CR</td>
<td>Oberweis, Schiefer</td>
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<td>T-WIWI-108716</td>
<td>Interdisciplinary Approach to Verifiable e-Voting</td>
<td>4,5 CR</td>
<td>Volkamer</td>
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<tr>
<td>T-WIWI-110108</td>
<td>Visual Computing</td>
<td>4,5 CR</td>
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### Election block: Praktika (at most 1 item)

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<tbody>
<tr>
<td>T-WIWI-103523</td>
<td>Advanced Lab Informatics</td>
<td>4,5 CR</td>
<td>Oberweis, Sack, Sunyaev, Sure-Vetter, Volkamer, Zöllner</td>
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<tr>
<td>T-WIWI-108439</td>
<td>Advanced Lab Security, Usability and Society</td>
<td>4,5 CR</td>
<td>Volkamer</td>
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<tr>
<td>T-WIWI-109786</td>
<td>Advanced Lab Security</td>
<td>4,5 CR</td>
<td>Volkamer</td>
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<tr>
<td>T-WIWI-109271</td>
<td>Advanced Lab User Studies in Security</td>
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</table>

**Competence Certificate**
The assessment is carried out as two partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student
- knows and has mastered methods and systems for core topics and core application areas of computer science,
- can choose these methods and system situation adequately and can furthermore design and employ them for problem solving,
- is able to independently find strategic and creative answers in the finding of solutions to well defined, concrete, and abstract problems.

**Prerequisites**
None
Content
The elective module conveys advanced knowledge in the area of applied computer science. This includes, for example, the efficient design and optimization of technical systems, the design and management of database applications or the systematic development of large software systems. Moreover, modeling of complex systems, the use of computer science methods to support knowledge management, and the design and implementation of service-oriented architectures are discussed in this module.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
## 6.17 Module: Electrical Engineering [M-ETIT-101155]

**Responsible:** Dr. Wolfgang Menesklou  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** Engineering Sciences (mandatory)

<table>
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</table>

**Competence Certificate**  
The assessment of the module is carried out by a written examination about the lecture *Electrical Engineering I* [23223] (according to Section 4(2), 1 of the examination regulation).  
The grade of the module corresponds to the grade of this examination.

**Competence Goal**  
The student knows and understands basic terms of electrical engineering and should be able to carry out simple calculations of DC and AC circuits.

**Content**  
Supporting the lecture, assignments to the curriculum are distributed. These are solved into additional (voluntary) tutorials.

**Workload**  
See German version.
6.18 Module: Emphasis in Fundamentals of Engineering [M-MACH-101261]

**Responsible:** Prof. Dr. Michael Hoffmann

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

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**Election block: Vertiefung ingenieurwissenschaftlicher Grundlagen (at least 9 credits)**

<table>
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<tr>
<td>T-ETIT-100534</td>
<td>Electrical Engineering for Business Engineers, Part II</td>
<td>5</td>
<td>Menesklo</td>
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<tr>
<td>T-MACH-102079</td>
<td>Material Science II for Business Engineers</td>
<td>5</td>
<td>Hoffmann</td>
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<tr>
<td>T-MACH-102210</td>
<td>Introduction to Engineering Mechanics II : Dynamics</td>
<td>5</td>
<td>Fidlin</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is removed from the average of the partial examinations, with at least two partial exams need to be.

**Competence Goal**

Students acquire and deepen skills in engineering fundamentals and can apply them to technical problems. Specific teaching objectives are agreed with the respective coordinator of the course.

**Content**

The module content depends on the elected courses.

**Annotation**

Starting winter term 2016/1017 the course “Introduction to Engineering Mechanics II : Dynamics” [2162276] will be held in winter term.

**Workload**

See German version.
6.19 Module: Emphasis Materials Science [M-MACH-101262]

**Responsible:** Prof. Dr. Michael Hoffmann

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

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**Election block: Vertiefung Werkstoffkunde (at least 9 credits)**

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<td>Material Science II for Business Engineers</td>
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<tr>
<td>T-MACH-102141</td>
<td>Constitution and Properties of Wearresistant Materials</td>
<td>4 CR</td>
<td>Ulrich</td>
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<td>T-MACH-100287</td>
<td>Introduction to Ceramics</td>
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<td>T-MACH-102102</td>
<td>Physical Basics of Laser Technology</td>
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<td>T-MACH-102137</td>
<td>Polymer Engineering I</td>
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<tr>
<td>T-MACH-102138</td>
<td>Polymer Engineering II</td>
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<td>T-MACH-102139</td>
<td>Failure of Structural Materials: Fatigue and Creep</td>
<td>4 CR</td>
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<td>T-MACH-102140</td>
<td>Failure of Structural Materials: Deformation and Fracture</td>
<td>4 CR</td>
<td>Gumbsch, Weygand</td>
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<td>T-MACH-102157</td>
<td>High Performance Powder Metallurgy Materials</td>
<td>4 CR</td>
<td>Schell</td>
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<td>T-MACH-102179</td>
<td>Structural Ceramics</td>
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<td>T-MACH-102170</td>
<td>Structural and Phase Analysis</td>
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<td>Wagner</td>
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<td>T-MACH-100531</td>
<td>Systematic Materials Selection</td>
<td>4 CR</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is removed from the average of the partial examinations, with at least two partial exams need to be.

**Competence Goal**
Students acquire and deepen skills in fundamentals of materials science and engineering and can apply them to technical problems. Specific teaching objectives are agreed with the respective coordinator of the course.

**Prerequisites**
None

**Content**
The module content depends on the elected courses.

**Workload**
The module requires an average workload of 270 hours.

Responsible: Prof. Dr Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
Compulsory Elective Modules (Betriebswirtschaftslehre)

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<td>Ulrich</td>
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<td>Englisch</td>
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<td>2</td>
<td>Python for Empirical Finance</td>
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<td>Ulrich</td>
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</table>

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 and 3 of the examination regulation) of the single courses of this module.
The assessment of "Empirical Finance" is carried out in form of a written exam (90 minutes), the assessment of "Python for Empirical Finance" is carried out in form of six biweekly Python programming tasks and offered each winter term.
The overall grade of the module is the grade of the written exam weighted with factor 0.75 and the grade for the Python programming tasks weighted with factor 0.25. The resulting grade is truncated after the first decimal.

Competence Goal
Students learn the fundamental concepts of modern portfolio theory and their realization in Python. The course focuses on the implementation of statistical concepts in Python, such that students are able to make investment decision under uncertainty after successful completion of this module.

Content
The module covers several topics, among them:
- Mean-Variance Portfolio Optimization
- Modeling Distribution of Asset Returns with Factor Models and ARMA-GARCH
- Monte-Carlo Simulation
- Parameter Estimation with Maximum Likelihood and Regressions?

Recommendation
Prior knowledge of statistics is recommended.

Workload
Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module. The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.
6.21 Module: Energy Economics [M-WIWI-101464]

**Responsible:** Prof. Dr. Wolf Fichtner

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)

<table>
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**Election block: Ergänzungsangebot (3.5 credits)**

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<td>Energy Policy</td>
<td>3.5 CR</td>
<td>Wietschel</td>
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<tr>
<td>T-WIWI-100806</td>
<td>Renewable Energy-Resources, Technologies and Economics</td>
<td>3.5 CR</td>
<td>Jochem, McKenna</td>
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</table>

**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) about the lecture *Introduction to Energy Economics* [2581010] and one optional lecture of the module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- is able to understand interdependencies in energy economics and to evaluate ecological impacts in energy supply,
- is able to assess the different energy carriers and their characteristics,
- knows the energy political framework conditions,
- gains knowledge about new market-based conditions and the cost and potentials of renewable energies in particular.

**Prerequisites**

The lecture *Introduction to Energy Economics* [2581010] has to be examined.

**Content**

- Introduction to Energy Economics: Characterisation (reserves, suppliers, cost, technologies) of different energy carriers (coal, gas, oil, electricity, heat etc.)
- Renewable Energy - Resources, Technology and Economics: Characterisation of different renewable energy carriers (wind, solar, hydro, geothermal etc.)
- Energy Policy: Management of energy flows, energy-political targets and instruments (emission trading etc.)

**Recommendation**

The courses are conceived in a way that they can be attended independently from each other. Therefore, it is possible to start the module in winter and summer term.

**Annotation**

Additional study courses (e.g. from other universities) can be transferred to the grade of the module on special request at the institute.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Energy Generation and Network Components [M-ETIT-101165]

**Responsible:** Dr.-Ing. Bernd Hoferer  
Prof. Dr.-Ing. Thomas Leibfried

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)

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Mandatory

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<tr>
<td>T-ETIT-101924</td>
<td>Power Generation</td>
<td>3 CR</td>
<td>Hoferer</td>
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<td>T-ETIT-101925</td>
<td>Design and Operation of Power Transformers</td>
<td>3 CR</td>
<td>Leibfried, Schäfer</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the weighted average of the grades for each course and truncated after the first decimal.

**Competence Goal**

The student

- has basic and advanced knowledge of electrical power engineering.
- is capable to analyse, calculate and develop electrical power engineering systems.

**Prerequisites**

It is only possible to choose this module in combination with the module Power Networks [WW3INGETIT3]. The module is passed only after the final partial exam of Power Networks is additionally passed.

**Content**

The module deals with basic knowledge about the structure and operation of electrical power networks and their needed facilities. Further lectures give an insight into specific topics, such as Automation in electric power engineering or the procedures for generating electrical energy.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.

**Responsible:** Prof. Dr.-Ing. Alexander Fidlin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences (mandatory)

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<td>T-MACH-102208</td>
<td>Introduction to Engineering Mechanics I: Statics and Strength of Materials</td>
<td>3 CR</td>
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</table>

**Competence Certificate**
The assessment consists of a written examination taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place in every semester. Re-examinations are offered at every ordinary examination date.

Permitted utilities: non-programmable calculator, literature

**Competence Goal**
The student
- knows and understands the basic elements of statics,
- is able to solve basic problems in statics independently.

**Prerequisites**
None

**Content**
Statics: force • moment • general equilibrium conditions • center of gravity • inner forces in structure • plane frameworks • adhesion

**Annotation**
Starting summer 2016 the course "Introduction to Engineering Mechanics I: Statics and Strength of Materials" [2162238] will be held in summer term.

**Workload**
The total workload for this module is approximately 90 hours

**Learning type**
Lecture and exercises
6.24 Module: Essentials of Finance [M-WIWI-101435]

**Responsible:** Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre)

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**Mandatory**

| T-WIWI-102605 | Financial Management | 4,5 CR | Ruckes |
| T-WIWI-102604 | Investments | 4,5 CR | Uhrig-Homburg |

**Competence Certificate**
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student

- has fundamental skills in modern finance
- has fundamental skills to support investment decisions on stock, bond and derivative markets
- applies concrete models to assess investment decisions on financial markets as well as corporate investment and financing decisions.

**Prerequisites**
None

**Content**
The module Essentials of Finance deals with fundamental issues in modern finance. The courses discuss fundamentals of the valuation of stocks. A further focus of this module is on modern portfolio theory and analytical methods of capital budgeting and corporate finance.

**Workload**
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
6.25 Module: Extracurricular Module in Engineering [M-WIWI-101404]

**Responsible:** Prüfungsausschuss der KIT-Fakultät für Wirtschaftswissenschaften

**Organisation:** KIT Department of Economics and Management

**Part of:** Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

**Credits:** 9

**Recurrence:** Once

**Level:** 3

**Version:** 4

**Election block: Wahlpflichtangebot (between 9 and 12 credits)**

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**Competence Certificate**
The assessment of the module is determined by the respective module coordinator. It can either be in the form of a general exam or partial exams, and must contain at least 9 credit points (max. 12 credits) and at least 6 hours per week (max. 8 hours per week). The examination may contain presentations, experiments, laboratories, term papers, etc. At least 50 percent of the module examination has to be in the form of a written or an oral examination (according to Section 4 (2), 1 or 2 of the examination regulation).

The formation of the overall grade of the module will be determined by the respective module coordinator.

**Competence Goal**
See German version.

**Prerequisites**
The intended composition of courses, the module designation and the details of the examination for an Extracurricular Module in Engineering must be confirmed by a module coordinator (professor) of the responsible engineering department. The module coordinator makes sure that the individual courses of the module complement each other in a meaningful way and that no random sequence of various individual examinations is combined.

The responsible module coordinator certifies that the examination can be taken as described and that the details of the courses in the application are correct.

The informal application (not handwritten!) will then be submitted to the Examination Office of the KIT Department of Economics and Management.

The examination board of the KIT Department of Economics and Management decides on the basis of the rules and regulations that have been adopted, in particular with regard to the content (see also https://www.wiwi.kit.edu/Genehmigung_Ingenieurmodul.php_Ingenieurmodul.php) as well as the application form completed by the student and signed by the respective module coordinator.

A maximum of one Extracurricular Module in Engineering can be taken.
### 6.26 Module: Foundations of Informatics [M-WIWI-101417]

**Responsible:**
Dr. rer. nat. Pradyumn Kumar Shukla  
Prof. Dr. York Sure-Vetter

**Organisation:**
KIT Department of Economics and Management

**Part of:**
Informatics (mandatory)

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<td>Foundations of Informatics I</td>
<td>5 CR</td>
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<td>T-WIWI-102707</td>
<td>Foundations of Informatics II</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 and 3 of the examination regulation) of the individual courses of this module.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. For a successful module assessment both partial exams have to be passed.

- Foundations of Informatics I: Written exam in the first week of the recess period (60 min)
- Foundations of Informatics II: Written exam in the first week of the recess period (90 min). It is possible to gain 0.3-0.4 additional grading points for a passed exam by successful completion of a bonus exam.

When both partial exams are passed, the overall grade of the module is the average of the grades for each course weighted by the credit points and truncated after the first decimal.

**Competence Goal**

The student

- knows the main principles, methods and systems of computer science,
- can use this knowledge for applications in advanced computer science courses and other areas for situation-adequate problem solving,
- is capable of finding strategic and creative responses in the search for solutions to well defined, concrete, and abstract problems.

The student can deepen the learned concepts, methods, and systems of computer science in advanced computer science lectures.

**Prerequisites**

None

**Content**

This module conveys knowledge about modeling, logic, algorithms, sorting and searching algorithms, complexity theory, problem specifications, and data structures. From the field of theoretical computer science, formal models of automata, languages and algorithms are presented and applied to the architecture of computer systems.

**Recommendation**

It is strongly recommended to attend the courses of the core program in the following sequence: *Introduction to Programming with Java, Foundations of Informatics I, Foundations of Informatics II*

**Workload**

The total workload for this module is approximately 300 hours.
Module: Foundations of Marketing [M-WIWI-101424]

**Responsible:** Prof. Dr. Martin Klarmann

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre)

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<td>Managing the Marketing Mix</td>
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**Election block: Ergänzungsangebot (at least 4.5 credits)**

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<tr>
<td>T-WIWI-102806</td>
<td>Services Marketing and B2B Marketing</td>
<td>3 CR</td>
<td>Klarmann</td>
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<td>T-WIWI-102807</td>
<td>International Marketing</td>
<td>1.5 CR</td>
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**Compentence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

The course MarketinMix is compulsory and must be examined.

**Content**

The core course of the module is "Marketing Mix". This course is compulsory and must be examined. "Marketing Mix" contains instruments and methods that enable you to goal-oriented decisions in the operative marketing management (product management, pricing, promotion and sales management).

To deepen the marketing knowledge students can complete the courses "Services- and B2B-Marketing" and "International Marketing".

**Annotation**

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
M 6.28 Module: Fundamentals of Business Administration 1 [M-WIWI-101494]

Responsibilities:
Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg
Prof. Dr. Marcus Wouters

Organisation:
KIT Department of Economics and Management
Part of:
Business Administration (mandatory)

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<td>3 CR</td>
<td>Nieken, Ruckes</td>
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<tr>
<td>T-WIWI-102819</td>
<td>Business Administration: Finance and Accounting</td>
<td>4 CR</td>
<td>Ruckes, Uhrig-Homburg, Wouters</td>
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Competence Certificate
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the individual courses of this module. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedure of each course of this module is defined for each course separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student
- has core skills in business administration in particular with respect to decision making and the model based view of business corporations
- masters the fundamentals of business and information management as well as the fundamentals business finance and the principles of business accounting
- is able to analyze and assess central tasks, functions and decisions in modern corporations

The knowledge of the two fundamentals modules in business administration forms the basis for the successful completion of advanced courses in the field of business administration and management.

Prerequisites
None

Content
This module provides the fundamentals of business administration and management. Further, the module focuses on the fields of management and organization, information engineering and management, investment and financing as well as of the principles of management and financial accounting.

Recommendation
It is strongly recommended to take the courses in the first semester of study.

Workload
The total workload of the module is about 210 hours. The workload is proportional to the credit points of the individual courses.
Module: Fundamentals of Business Administration 2 [M-WIWI-101578]

Responsible: Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: Business Administration (mandatory)

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### Competence Certificate

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures of each course of this module is defined for each course separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

### Competence Goal

The student

- has core skills in business administration in particular with respect to decision making and the model based view of business corporations
- masters the fundamentals of production and operations management and marketing as well as the fundamentals of management and financial accounting
- is able to analyze and assess central tasks, functions and decisions in modern corporations

The knowledge of the two fundamentals modules in business administration forms the basis for the successful completion of advanced courses in the field of business administration and management.

### Prerequisites

None

### Content

The basics of internal and external accounting and general business administration are taught as the theory of business in the company. Building on this, the focus will be on marketing and production management.

### Recommendation

It is strongly recommended to take the courses in the second semester (Betriebswirtschaftslehre: Produktionswirtschaft und Marketing) and third semester (Rechnungswesen) of study.

### Workload

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
Module: Fundamentals of Construction [M-BGU-101004]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo- and Environmental Sciences
Part of: Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
Compulsory Elective Modules (Ingenieurwissenschaften)

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<td>T-BGU-101675</td>
<td>Project Management</td>
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### Competence Goal

The student
- is familiar with all substantial domains of construction
- knows and understands substantial construction methods and construction machines
- masters basic construction calculations
- knows and understands the fundamentals of project management in civil engineering
- can apply his/her knowledge in a goal-oriented manner to accomplish a construction project efficiently

### Prerequisites

none

### Recommendation

None

### Annotation

We encourage students to deepen their knowledge in construction by building additional customized modules from the courses offered by TMB. Please consult with the tutors of this module. Further information is available at www.tmb.kit.edu.

**Responsible:** Prof. Dr. Gerhard Satzger  
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)  
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
Compulsory Elective Modules (Betriebswirtschaftslehre)

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**Election block: Wahlpflichtangebot (9 credits)**

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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

Students

- understand services from different perspectives and the concept of value creation in service networks
- know about the concepts, methods and tools for the design, modelling, development and management of digital services and are able to use them
- understand the basic characteristics and effects of integrated information system as a an integral element of digital services
- gain experience in group work as well as in the analysis of case studies and the professional presentation of research results
- practice skills in the English language in preparation of jobs in an international environment

**Prerequisites**

None

**Content**

Global economy is increasingly determined by services: in industrialized countries nearly 70% of gross value added is achieved in the tertiary sector. Unfortunately, for the design, development and the management of services traditional concepts focused on goods are often insufficient or inappropriate. Besides, the rapid technical advance in the information and communication technology sector pushes the economic importance of digital services even further thus changing the competition environment. ICT-based interaction and individualization open up completely new dimensions of shared value between clients and providers, dynamic and scalable "service value networks" replace established value chains, digital services are provided globally crossing geographical boundaries. This module establishes a basis for further specialization in service innovation, service economics, service design, service modelling, service analytics as well as the transformation and coordination of service networks.

**Recommendation**

None

**Annotation**

This module is part of the KSRI teaching profile "Digital Service Systems". Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Handling Characteristics of Motor Vehicles [M-MACH-101264]

Responsibility: Prof. Dr. Frank Gauterin
Organisation: KIT Department of Mechanical Engineering

Part of:
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

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Election block: Fahrzeugeigenschaften (at least 9 credits)

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<td>T-MACH-105153</td>
<td>Handling Characteristics of Motor Vehicles II</td>
<td>3 CR</td>
<td>Unrau</td>
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<td>T-MACH-105154</td>
<td>Vehicle Comfort and Acoustics I</td>
<td>3 CR</td>
<td>Gauterin</td>
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<td>T-MACH-105155</td>
<td>Vehicle Comfort and Acoustics II</td>
<td>3 CR</td>
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<td>Vehicle Mechatronics I</td>
<td>3 CR</td>
<td>Ammon</td>
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<tr>
<td>T-MACH-102156</td>
<td>Project Workshop: Automotive Engineering</td>
<td>4,5 CR</td>
<td>Frey, Gauterin, Gießler</td>
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Compentence Certificate
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student
- knows and understands the characteristics of vehicles, owing to the construction and design tokens,
- knows and understands especially the factors being relevant for comfort and acoustics
- is capable of fundamentally evaluating and rating handling characteristics.

Prerequisites
None

Content
See courses.

Recommendation

Workload
The total work load for this module is about 270 Hours (9 Credits). The partition of the work load is carried out according to the credit points of the courses of the module. The work load for courses with 4.5 credit points is about 135 hours, and for courses with 3 credit points about 90 hours. The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam duration and the time that is required to achieve the objectives of the module as an average student with an average performance.
**6.33 Module: Human Resources and Organizations [M-WIWI-101513]**

**Responsible:** Prof. Dr. Petra Nieken  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)  
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
Compulsory Elective Modules (Betriebswirtschaftslehre)

**Mandatory**

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- **T-WIWI-102909** Human Resource Management  
  4.5 CR Nieken

**Election block: Ergänzungsangebot (between 4.5 and 5.5 credits)**

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- **T-WIWI-102630** Managing Organizations  
  3.5 CR Lindstädt

- **T-WIWI-102908** Personnel Policies and Labor Market Institutions  
  4.5 CR Nieken

- **T-WIWI-102871** Problem Solving, Communication and Leadership  
  2 CR Lindstädt

**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- knows and analyzes basic concepts, instruments, and challenges of present human resource and organizational management.
- uses the techniques he / she has learned to evaluate strategic situations which occur in human resource and organizational management.
- evaluates the strengths and weaknesses of existing structures and rules based on systematic criterions.
- Discusses and evaluates the practical use of models and methods by using case studies.
- has basic knowledge of fit and challenges of different scientific methods in the context of personnel and organizational economics.

**Prerequisites**

The course Personalmanagement (Human Resource Management) is compulsory and must be examined.

**Content**

Students acquire basic knowledge in the field of human resource and organizational management. Strategic as well as operative aspects of human resource management practices are analyzed. The module offers an up-to-date overview over basic concepts and models. It also shows the strengths and weaknesses of rational concepts in human resources and organizational management.

The students learn to apply methods and instruments to plan, select, and manage staff. Current issues of organizational management or selected aspects of personnel politics are examined and evaluated.

The focus lies on the strategic analysis of decisions and the use microeconomic or behavioral approaches. Empirical results of field or lab studies are discussed critically.

**Recommendation**

Completion of module Business Administration is recommended.

Basic knowledge of microeconomics, game theory and statistics is recommended.

**Workload**

The total workload for this module is approximately 270 hours.
### 6.34 Module: Industrial Production I [M-WIWI-101437]

**Responsible:** Prof. Dr. Frank Schultmann  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)  
**Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)**  
**Compulsory Elective Modules (Betriebswirtschaftslehre)**

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<td>T-WIWI-102606</td>
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<td>5,5 CR</td>
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**Election block: Ergänzungsangebot (3.5 credits)**

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<td>Logistics and Supply Chain Management</td>
<td>3.5 CR</td>
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<td>T-WIWI-102820</td>
<td>Production Economics and Sustainability</td>
<td>3.5 CR</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course “Fundamentals of Production Management” [2581950] and one further single course of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

- Students shall be aware of the important role of industrial production and logistics for production management.
- Students shall use relevant concepts of production management and logistics in an adequate manner.
- Students shall be able to reflect on decision principles in firms and their circumstances in the light of the production management aspects studied.
- Students shall be proficient in describing essential tasks, difficulties and solutions to problems in production management and logistics.
- Students shall be able to describe relevant approaches of modeling production and logistic systems.
- Students shall be aware of the important role of material and energy-flows in production systems.
- Students shall be proficient in using exemplary methods for solving selected problems.

**Prerequisites**

The course “Fundamentals of Production Management” [2581950] and one additional activity have to be chosen.

**Content**

This module is designed to introduce students into the wide area of industrial production and logistics management. It focuses on strategic production management under the aspect of sustainability. The courses use interdisciplinary approaches of systems, also theory to describe the central tasks of industrial production management and logistics. Herein, attention is drawn upon strategic corporate planning, research and development as well as site selection. Students will obtain knowledge in solving internal and external transport and storage problems with respect to supply chain management and disposal logistics.

**Workload**

Total effort will account to 270 hours (9 credit points) and can be allocated according to the credit point rating. Therefore, a course with 3.5 credits requires an effort of approximately 105h and a course with 5.5 credits 165h.

The total effort for each course consists of attending lectures and tutorials, examination times and the time an average student needs to prepare himself in order to pass the exam with an average grade.

**Responsible:** Prof. Dr. Alexander Mädche  
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)  
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
Compulsory Elective Modules (Betriebswirtschaftslehre)

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**Election block: Wahlpflichtangebot ()**

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<tr>
<td>T-WIWI-109816</td>
<td>Foundations of Interactive Systems</td>
<td>4,5 CR</td>
<td>Mädche</td>
<td></td>
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<tr>
<td>T-WIWI-109936</td>
<td>Platform Economy</td>
<td>4,5 CR</td>
<td>Weinhardt</td>
<td></td>
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<tr>
<td>T-WIWI-109935</td>
<td>Practical Seminar Interaction</td>
<td>4,5 CR</td>
<td>Mädche, Weinhardt</td>
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</table>

**Competence Certificate**
The module examination takes place in the form of partial examinations in accordance with § 4 Para. 2 No. 1 - No. 3 SPO via courses of the module amounting to a total of at least 9 LP.
The overall score of the module is formed from the credit-weighted scores of the partial examinations and truncated after the first decimal place.

**Competence Goal**

**Students**

- understand the basic concepts of interactive systems as well as the economic foundations and key components of platforms
- explore the theoretical grounding of interactive systems leveraging theories from reference disciplines such as psychology
- understand business models, network effects of digital platforms and get to know different market forms and market mechanisms
- gain experience in group work as well as in the analysis of case studies and the professional presentation of research results

**Content**
The “Information Systems & Digital Business” modules of the research groups of Prof. Dr. Alexander Mädche (Information Systems & Service Design), Prof. Dr. Gerhard Satzger (Digital Service Innovation) and Prof. Dr. Christof Weinhardt (Information & Market Engineering), offer a comprehensive overview on important topics of digitalization – blending aspects of digital interaction, digital services and the platform economy.

Courses in this module cover the aspects of interaction between humans and information systems as well as the economic foundations of platform businesses:

- **Foundations of Interactive Systems**: Advanced information and communication technologies (ICT) make interactive systems ever-present in the users’ private and business life. They are an integral part of E-Commerce portals or social networking sites as well as at the workplace, e.g. in the form of collaboration portals or analytical dashboards. Furthermore, with the ever-increasing capabilities of ICT, the design of human-computer interaction is becoming increasingly important. The aim of this module is to introduce the foundations, related theories, key concepts, and design principles as well as current practice of contemporary interactive systems. The students get the necessary knowledge to guide the successful implementation of interactive systems in business and private life.

- **Platform Economy**: Apple, Alphabet, Amazon, Microsoft, and Facebook; five of the most valuable companies worldwide create large portions of their profits employing a digital platform model. This module teaches the key design considerations of digital platforms: their foundations in economic theory, their core components and design aspects, the adequate selection of market mechanisms for achieving certain goals and the role of user behavior in the context of digital platforms. The theoretic foundations are enriched by discussions of several real-world examples, e.g. from the finance sector. Thus, the students are enabled to a) analyze given platforms and make recommendations for improvements and b) independently design new platforms for given use cases.
Workload
Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module (120-135h for courses with 4.5 credit points). The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

**Responsible:** Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre)

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<th>Level</th>
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<td>T-WIWI-109938 Digital Services</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-109941 eFinance: Information Systems for Securities Trading</td>
<td>4.5 CR</td>
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<td>T-WIWI-109936 Platform Economy</td>
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<tr>
<td>T-WIWI-109937 Practical Seminar Platforms</td>
<td>4.5 CR</td>
<td>Satzger, Weinhardt</td>
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**Competence Certificate**
The module examination takes place in the form of partial examinations in accordance with § 4 Para. 2 No. 1 - No. 3 SPO via courses of the module amounting to a total of at least 9 LP. The overall score of the module is formed from the credit-weighted scores of the partial examinations and truncated after the first decimal place.

**Competence Goal**
Students

- understand services from different perspectives, the concept of value creation in service systems as well as the economic foundations and key components or platforms
- get familiar with concepts, methods and tools for the design, modelling, development and management of digital services and platforms
- understand the categories and trends of platforms as providers of digital services
- gain experience in group work as well as in the analysis of case studies and the professional presentation of research results
- are enabled to design new platforms based on a business idea.

**Content**
The “Information Systems & Digital Business” modules of the research groups of Prof. Dr. Alexander Mädche (Information Systems & Service Design), Prof. Dr. Gerhard Satzger (Digital Service Innovation) and Prof. Dr. Christof Weinhardt (Information & Market Engineering), offer a comprehensive overview on important topics of digitalization – blending aspects of digital interaction, digital services and the platform economy.

Courses in this module cover the technical and economic aspects of digital services as well as their application in the platform economy:

- **Digital Services:** The global economy is increasingly determined by services: in industrialized countries, nearly 70% of gross value added is achieved in the tertiary sector. For the design, development and the management of services traditional “goods-focused” concepts are often insufficient or inappropriate – even more so, if companies reap the ample opportunities to offer digital services. The course is centered around the concepts of joint value creation within service systems. It covers the theoretical background of services and service innovation, technical and economic aspects of cloud and cloud labor services as well as webservices. It focusses on the potential to leverage data for novel digital services and business models and to form dynamic and scalable service value networks. It comprises hands-on experience to conceive and build novel digital, cloud-based services.

- **Platform Economy:** Apple, Alphabet, Amazon, Microsoft, und Facebook; five of the most valuable companies worldwide create large portions of their profits employing a digital platform model. This module teaches the key design considerations of digital platforms: their foundations in economic theory, their core components and design aspects, the adequate selection of market mechanisms for achieving certain goals and the role of user behavior in the context of digital platforms. The theoretic foundations are enriched by discussions of several real-world examples, e.g. from the finance sector. Thus, the students are enabled to a) analyze given platforms and make recommendations for improvements and b) independently design new platforms for given use cases.
Workload
Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module (120-135h for courses with 4.5 credit points). The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

**Responsible:** Prof. Dr. Alexander Mädche  
Prof. Dr. Gerhard Satzger

**Organisation:** KIT Department of Economics and Management

**Part of:**  
Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)  
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
Compulsory Elective Modules (Betriebswirtschaftslehre)

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**Election block: Wahlpflichtangebot (W)**

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**Competence Certificate**

The module examination takes place in the form of partial examinations in accordance with § 4 Para. 2 No. 1 - No. 3 SPO via courses of the module amounting to a total of at least 9 LP. The overall score of the module is formed from the credit-weighted scores of the partial examinations and truncated after the first decimal place.

**Competence Goal**

Students

- understand services from different perspectives and the concept of value creation in service systems
- get familiar with concepts, methods and tools for the design, modelling, development and management of digital services and interactive systems
- understand the basic characteristics and effects of interactive systems as an integral element of digital services – theoretically grounded in reference disciplines such as psychology
- get hands-on experience in conceptualizing and designing digital services and interactive systems in real use cases.

**Content**

The “Information Systems & Digital Business” modules of the research groups of Prof. Dr. Alexander Mädche (Information Systems & Service Design), Prof. Dr. Gerhard Satzger (Digital Service Innovation) and Prof. Dr. Christof Weinhardt (Information & Market Engineering), offer a comprehensive overview on important topics of digitalization – blending aspects of digital interaction, digital services and the platform economy.

Courses in this module cover the technical and economic aspects of digital services as well as the interaction of humans with information systems:

- **Digital Services:** The global economy is increasingly driven by services: in industrialized countries, nearly 70% of gross value added is achieved in the tertiary sector. For the design, development and the management of services traditional "goods-focused" concepts are often insufficient or inappropriate – even more so, if companies reap the ample opportunities to offer digital services. The course is centered around the concepts of joint value creation within service systems. It covers the theoretical background of services and service innovation, technical and economic aspects of cloud and cloud labor services as well as webservices. It focuses on the potential to leverage data for novel digital services and business models and to form dynamic and scalable service value networks. It comprises hands-on experience to conceive and build novel digital, cloud-based services.

- **Foundations of Interactive Systems:** Advanced information and communication technologies (ICT) make interactive systems ever-present in the users’ private and business life. They are an integral part of E-Commerce portals or social networking sites as well as at the workplace, e.g. in the form of collaboration portals or analytical dashboards. Furthermore, with the ever-increasing capabilities of ICT, the design of human-computer interaction is becoming increasingly important. The aim of this module is to introduce the foundations, related theories, key concepts, and design principles as well as current practice of contemporary interactive systems. The students get the necessary knowledge to guide the successful implementation of interactive systems in business and private life.
Workload
Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module (120-135h for courses with 4.5 credit points). The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.
Module: Integrated Production Planning [M-MACH-101272]

Responsible: Prof. Dr.-Ing. Gisela Lanza

Organisation: KIT Department of Mechanical Engineering

Part of:
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

Credits: 9
Recurrence: Each summer term
Duration: 1 semester
Language: Deutsch
Level: 3
Version: 3

Mandatory

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<td>T-MACH-109054</td>
<td>Integrated Production Planning in the Age of Industry 4.0</td>
<td>9 CR Lanza</td>
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Competence Certificate
Written Exam (120 min)

Competence Goal
The students
- can discuss basic questions of production technology.
- are able to apply the methods of integrated production planning they have learned about to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about for a specific problem.
- can apply the learned methods of integrated production planning to new problems.
- can use their knowledge targeted for efficient production technology.

Prerequisites
none

Content
Within this engineering sciences-oriented module the students will get to learn principle aspects of organization and planning of production systems.

Workload
regular attendance: 63 hours
self-study: 207 hours

Learning type
Lecture, exercise, excursion
6.39 Module: Internship [M-WIWI-101419]

Responsibility: Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften

Organisation: KIT Department of Economics and Management

Part of: Internship

Mandatory

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Competence Certificate

The assessment is carried out by the evidence of completed full-time internships of at least 12 weeks with at least 20 working hours per week and a presentation of the internship in the form of a written report on the activities. The internship is not graded.

1. Information on evidence of completed full-time internships:

The internship is proofed by the certificate of the intern's office. The certificate has to be formally correct with official corporate letterhead and handwritten countersigned by a responsible employee of the company.

The certificate must at least contain the following information:

* Company / Location
* Duration: from ... to ...
* Hours of work (weekly)
* Working interruption, indicating the vacation and sick days
* Department
* Headwords to the activities

2. Information on the presentation:

The internship report should be at least one page (typewritten, not handwritten) for each Location. It must be countersigned by a representative of the intern's office.

Competence Goal

- has general insight into the essential processes in a company,
- is in a position to identify operation correlations and has the knowledge and skills to facilitate a fast understanding of the processes in the company,
- in addition to practical professional experience and competences, also has key competences such as own initiative, ability to work in a team and communication skills as well as ability to integrate into corporate hierarchies and procedures,
- has the experience to accomplish complex IT and business tasks under realistic conditions within the framework of the relevant legal aspects and while applying the total acquired knowledge (interlaced thinking),
- has an idea of the professional development potential in the economy through pursuit of study-related activities,
- knows the technical and professional requirements in the individually targeted future occupation and can take this knowledge into account for the future planning of his/her studies and career,
- can assess and estimate own technical and professional strengths and weaknesses through his/her evaluation of the company.

Prerequisites

None
Content
The internship may be done in economic, business and/or technical companies. At best, it is done on activities which are located at the intersection of the two fields - getting to know the specific requirements of Industrial Engineering and Management.

A commercial internship provides an insight into business or administrative processes of business transactions. Therefor departments such as controlling, organizing, marketing and planning appear particularly suitable.

Work experiences in the departments of engineering, work preparation and provision of material or IT cover more technical aspects of the internship. But work experiences in an engineering firm go with a technical internship.

It remains the companies and interns left, which stations and areas the intern will eventually go through. But the focus should always be in accordance with operational realities of the company.

Annotation
Internships, that were completed even before studying may be recognized, if the criteria for recognition are met. After recognition of the compulsory internship, there can be taken a semester off for a voluntary, student-related internship.

Regarding to the election of the company, in which the internship is completed, there are no specific rules. With a view to the future professional career, it is recommended to absolve the internship in a larger, possibly international company.

Vacation days are not figured into the internship.

Only three sick leave days may incurred at all. Any additional sick days are not figured into the internship.

A relevant vocational education of at least two years is accepted as a performance equivalent to the internship.

Workload
The total workload for this module is approximately 300 hours.
6.40 Module: Introduction to Economics [M-WIWI-101398]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: Economics (mandatory)

<table>
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Mandatory

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<td>T-WIWI-102708</td>
<td>Economics I: Microeconomics</td>
<td>5 CR</td>
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<td>T-WIWI-102709</td>
<td>Economics II: Macroeconomics</td>
<td>5 CR</td>
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Competence Certificate
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module. The assessment procedures of each course of this module is defined for each course separately.

Competence Goal
The student

- knows and understands basic economic problems,
- understands economic policy in globalized markets,
- is able to develop elementary solution concepts.

The lectures of this module have different focuses: In Economics I, economic problems are seen as decision problems, Economics II treats the dynamics of economic processes.

Module grade calculation
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Content
The basic concepts, methods and models of micro- and macroeconomics are treated. The course Economics I: Microeconomics [2600012] deals with micro-economic decision theory, questions of market theory and problems of imperfect competition and with basic principles of game theory and welfare economics. Economics II: Macroeconomics [2600014] discusses economic organization models and national accounts as well as the question of international trade and monetary policy. Furthermore, the complex growth, boom and economic speculations are dealt with.

Annotation
Notice: The lecture Economics I: Microeconomics [2600012] is part of the preliminary examination concerning § 8(1) of the examination regulation. This examination must be passed until the end of the examination period of the second semester. Any Re-examinations has to be passed until the end of the examination period of the third semester. Otherwise the examination claim will be lost.

Workload
See German version.
Module: Introduction to Natural Hazards and Risk Analysis [M-WIWI-104838]

**Responsible:** Prof. Dr. Michael Kunz

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

**Credits:** 9

**Recurrence:** Each term

**Language:** Deutsch

**Level:** 3

**Version:** 3

**Election block: Wahlpflichtangebot (between 9 and 12 credits)**

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<td>T-BGU-101500</td>
<td>Introduction to Engineering Geology</td>
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<td>T-BGU-103541</td>
<td>Introduction to GIS for Students of Natural, Engineering and Geo Sciences, Prerequisite</td>
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<td>T-BGU-101637</td>
<td>Systems of Remote Sensing, Prerequisite</td>
<td>1 CR</td>
<td>Hinz</td>
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<td>T-BGU-101638</td>
<td>Procedures of Remote Sensing, Prerequisite</td>
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<td>Remote Sensing, Exam</td>
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<td>T-PHYS-103525</td>
<td>Geological Hazards and Risk</td>
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<td>T-PHYS-105594</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

See German version

**Prerequisites**

There are no singular exams for Remote Sensing Systems [20241/42] and Remote Sensing Methods [20265/66]. Therefore it is not possible to choose Remote Sensing (GEOD-BFB-1) and additionally the courses Remote Sensing Systems, Remote Sensing Methods or the project Angewandte Fernerkundung [20267] (because they are already included). See also “Recommendations”.

**Content**

See German version

**Recommendation**

The courses Remote Sensing Systems [20241/42] and Remote Sensing Methods [20265/66] may be chosen as a minimal combination for the exam. However, it is recommended to choose the comprehensive combination Remote Sensing [GEOD-BFB-1], which includes Remote Sensing Systems [20241/42], Remote Sensing Methods [20265/66] and the project Angewandte Fernerkundung [20267].

**Annotation**

Students, who successfully completed both modules “Understanding and Prediction of Disasters” I and II (alternatively: one of the modules in Bachelor and Master) can get a certificate of the module coordinator (CEDIM). This certificate lists the successful completed courses within the two modules.
Workload
The total workload for this module is approximately 270 hours. For further information see German version.

**Responsible:** Prof. Dr. Stefan Nickel  
Prof. Dr. Steffen Rebennack  
Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management

**Part of:** Operations Research (mandatory)

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<td>Introduction to Operations Research I and II</td>
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**Competence Certificate**

The assessment of the module is carried out by a written examination (120 minutes) according to Section 4(2), 1 of the examination regulation. In each term (usually in March and July), one examination is held for both courses.

**Competence Goal**

The student

- names and describes basic notions of the essential topics in Operations Research (Linear programming, graphs and networks, integer and combinatorial optimization, nonlinear programming, dynamic programming and stochastic models),
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.

**Module grade calculation**

The overall grade of the module is the grade of the written examination.

**Prerequisites**

None

**Content**

This module treats the following topics: linear programming, network models, integer programming, nonlinear programming, dynamic programming, queuing theory, heuristic models.

This module forms the basis of a series of advanced lectures with a focus on both theoretical and practical aspects of Operations Research.

**Workload**

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
**6.43 Module: Introduction to Programming [M-WIWI-101581]**

**Responsible:** Prof. Dr.-Ing. Johann Marius Zöllner  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Informatics (mandatory)

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**Competence Certificate**  
The assessment consists of a written resp. computer-based exam (60 min) according to Section 4 (2),1 of the examination regulation.  
The successful completion of the compulsory tests in the computer lab is prerequisite for admission to the written resp. computer-based exam.  
The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

**Competence Goal**  
see german version

**Prerequisites**  
None

**Content**  
see german version

**Workload**  
The total workload for this course is approximately 150 hours. For further information see German version.
Module: Introduction to Statistics [M-WIWI-101432]

**Responsible:** Prof. Dr. Oliver Grothe  
Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management

**Part of:** Statistics

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<td>5 CR</td>
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<td>T-WIWI-102738</td>
<td>Statistics II</td>
<td>5 CR</td>
<td>Grothe, Schienle</td>
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**Competence Certificate**

The assessment of this module consists of two written examinations according to Section 4(2), 1 of the examination regulation (one for each of the courses Statistics I and II).

The overall grade of the module is the average of the grades of these two written examinations.

**Competence Goal**

See German version.

**Module grade calculation**

The overall grade of the module is the average of the grades of these two written examinations.

**Prerequisites**

**Notice:** The lecture Statistics I [25008/25009] is part of the preliminary examination concerning Section 8(1) of the examination regulation. This examination must be passed until the end of the examination period of the second semester. Any Re-examinations has to be passed until the end of the examination period of the third semester. Otherwise the examination claim will be lost.

**Content**

The module contains the fundamental methods and scopes of Statistics.

A. Descriptive Statistics: univariate und bivariate analysis
B. Probability Theory: probability space, conditional and product probabilities, transformation of probabilities, parameters of location and dispersion, most important discrete and continuous distributions, covariance and correlation, limit distributions
C. Theory of estimation and testing: sufficiency of statistics, point estimation (optimality, ML-method), internal estimations, linear regression

**Workload**

The total workload for this module is approximately 300 hours. For further information see German version.
### 6.45 Module: Machine Tools and Industrial Handling [M-MACH-101286]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)  
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
- Compulsory Elective Modules (Ingenieurwissenschaften)

**Credits**  
- 9

**Recurrence**  
- Each winter term

**Duration**  
- 1 semester

**Language**  
- Deutsch

**Level**  
- 4

**Version**  
- 3

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**Competence Certificate**  
Written exam (120 minutes)

**Competence Goal**  
The students

- are able to assess the use and application of machine tools and handling equipment and to differentiate between them in terms of their characteristics and design
- can describe and discuss the essential elements of the machine tool (frame, main spindle, feed axes, peripheral equipment, control unit)
- are able to select and dimension the essential components of a machine tool
- are capable of selecting and evaluating machine tools according to technical and economic criteria.

**Prerequisites**  
None

**Content**  
The module overviews the construction, use and application of machine tools and industrial handling equipment. A well-founded and practice-oriented knowledge is imparted about the selection, design and evaluation of machine tools. First, the main components of the machine tools are systematically explained and their design principles as well as the integral machine tool design are discussed. Subsequently, the use and application of machine tools will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0.

The individual topics are:

- Frames and frame components
- Feed axes
- Spindles
- Peripheral equipment
- Control unit
- Metrological evaluation and machine testing
- Process monitoring
- Maintenance of machine tools
- Safety assessment of machine tools
- Machine examples

**Workload**  
regular attendance: 63 hours  
self-study: 207 hours

**Learning type**  
Lecture, exercise, excursio
6.46 Module: Management Accounting [M-WIWI-101498]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
Compulsory Elective Modules (Betriebswirtschaftslehre)

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<td>4,5</td>
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<td>T-WIWI-102801</td>
<td>Management Accounting 2</td>
<td>4,5</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
Students
• are familiar with various management accounting methods,
• can apply these methods for cost estimation, profitability analysis, and product costing,
• are able to analyze short-term and long-decisions with these methods,
• have the capacity to devise instruments for organizational control.

Prerequisites
None

Content
The module consists of two courses "Management Accounting 1" and "Management Accounting 2". The emphasis is on structured learning of management accounting techniques.

Annotation
The following courses are part of this module:

• The course Management Accounting 1, which is offered in every summer semester
• The course Management Accounting 2, which is offered in every winter semester

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
6.47 Module: Manufacturing Technology [M-MACH-101276]

Responsible: Prof. Dr.-Ing. Volker Schulze
Organisation: KIT Department of Mechanical Engineering

Part of:
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

Credits: 9
Recurrence: Each winter term
Duration: 1 semester
Language: Deutsch
Level: 3
Version: 4

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<td>Manufacturing Technology</td>
<td>9</td>
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Compétence Certificate
Written Exam (180 min)

Competence Goal
The students can:
- name different manufacturing processes, can describe their specific characteristics and are capable to depict the general function of manufacturing processes and are able to assign manufacturing processes to the specific main groups.
- identify correlations between different processes and to select a process depending on possible applications.
- describe the theoretical basics for the manufacturing processes they got to know within the scope of the course and are able to compare the processes.
- correlate based on their knowledge in materials science the processing parameters with the resulting material properties by taking into account the microstructural effects.
- evaluate different processes on a material scientific basis.

Prerequisites
None

Content
Within this engineering sciences-oriented module the students will get to learn principle aspects of manufacturing technology. Further information can be found at the description of the lecture "Manufacturing Technology".

Workload
regular attendance: 63 hours
self-study: 207 hours

Learning type
Lectures, exercise, excursion

**Responsible:** Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

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<td>T-MACH-102151</td>
<td>Material Flow in Logistic Systems</td>
<td>9 CR Furmans</td>
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**Competence Certificate**

The assessment (Prüfungsleistung anderer Art) consists of the following assignments:

- 40% assessment of the final case study as individual performance,
- 60% semester evaluation which includes working on 5 case studies and defending those (For both assessment types, the best 4 of 5 tries count for the final grade):
  - 40% assessment of the result of the case studies as group work,
  - 20% assessment of the oral examination during the case study colloquiums as individual performance.

A detailed description of the learning control can be found under T-MACH-102151.

**Competence Goal**

The student

- acquires comprehensive and well-founded knowledge on the main topics of logistics, an overview of different logistic questions in practice and knows the functionality of material handling systems,
- is able to illustrate logistic systems with adequate accuracy by using simple models,
- is able to realize coherences within logistic systems,
- is able to evaluate logistic systems by using the learnt methods.

**Prerequisites**

none

**Content**

The module *Material Flow in Logistic Systems* provides comprehensive and well-founded basics for the main topics of logistics. Within the lectures, the interaction between several components of logistic systems will be shown. The module focuses on technical characteristics of material handling systems as well as on methods for illustrating and evaluating logistics systems. To gain a deeper understanding, the course is accompanied by exercises and case studies.

**Workload**

270 hours

**Learning type**

Lectures, tutorials.
Module: Materials Science [M-MACH-101260]

**Responsible:** Prof. Dr. Michael Hoffmann

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences (mandatory)

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**Mandatory**

| T-MACH-102078 | Materials Science I | 3 CR | Hoffmann |

**Competence Certificate**

The assessment of the module is carried out by a written examination (150 min) about the lecture [Material Science](#) (according to Section 4(2), 1 of the examination regulation).

The examination is offered every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the summer term is carried out by a written or oral exam.

The grade of the module corresponds to the grade of this examination.

**Competence Goal**

Students are able to specify the basics of materials science and engineering and can apply it to simple problems in various technical areas.

As major part of the module, the students know the correlation between atomic structure and bonding of solids and the macroscopic properties such as mechanical behavior or electrical conductivity. They have basic knowledge with respect to materials characterization. The students are able to analyze phase diagrams with up to two components and can derive simple correlations among composition, processing, microstructure evolution and materials properties.

**Prerequisites**

None.

**Content**

After an introduction to the atomic structure and interatomic bonding, elementary concepts of crystallography are given. Different types of crystal structures are explained and various types of imperfections in solids. Then, the mechanical behaviour and the physical properties of various types of materials (metals, polymers, ceramics) are discussed. The thermodynamic principles of solidification and the basic types of phase diagrams are given to understand to iron-carbon phase diagram and the manifold microstructures of steel and cast iron.

**Workload**

The total workload for this module is approximately 90 hours.
6.50 Module: Mathematics 1 [M-MATH-101676]

**Responsible:** Prof. Dr. Günter Last

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematics

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<td>Mathematics I - Final Exam</td>
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**Competence Certificate**
The assessment consists of two written exams of 60 min each (in accordance with §4(2), 1 of the examination regulations). The first (midterm) exam takes place after half of the course, the second (final) exam takes place shortly after the end of the lectures. Auxiliary means such as literature or calculators are not allowed. Resit exams for both exams are offered in the first weeks of the subsequent semester.

**Competence Goal**

Students

- are confident with basic terms and definitions of mathematical language (propositions, sets, number systems, mappings, etc.).
- have a basic knowledge of differentiable calculus for functions of a single variable.

**Module grade calculation**
The examination mark for Mathematics 1 is the average of the marks obtained in the midterm exam and final exam.

**Content**
The course Mathematics 1 is the first part of the three semester basic training in higher mathematics. Topics are

- Propositional logic and basic set theory,
- Combinatorics and principles of counting,
- Number systems and basic arithmetics,
- Systems of linear equations,
- Convergence of sequences and series,
- Mappings and functions,
- Continuous functions,
- Differentiable functions,
- Power series and special functions,
- Taylor’s theorem.

**Recommendation**

There are no Prerequisites. We strongly recommend to attend the three maths courses in the order Mathematics 1, Mathematics 2, Mathematics 3.

**Workload**

work load: 210 hours (7 ECTS)
classes: 60 hours lectures + 30 hours exercises
6.51 Module: Mathematics 2 [M-MATH-101677]

Responsible: Prof. Dr. Günter Last
Organisation: KIT Department of Mathematics
Part of: Mathematics

<table>
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<td>T-MATH-102262</td>
<td>Mathematics II - Midterm Exam</td>
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<td>T-MATH-102263</td>
<td>Mathematics II - Final Exam</td>
<td>3.5 CR</td>
<td>Each summer term</td>
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Competence Certificate
The assessment consists of two written exams of 60 min each (in accordance with §4(2), 1 of the examination regulations). The first (midterm) exam takes place after half of the course, the second (final) exam takes place shortly after the end of the lectures. Auxiliary means such as literature or calculators are not allowed. Resit exams for both exams are offered in the first weeks of the subsequent semester.

Competence Goal
Students
- know basic concepts of matrix theory.
- have a basic knowledge of integral calculus in a single variable.
- have a basic knowledge of multivariate differential calculus.

Module grade calculation
The examination mark for Mathematics 2 is the average of the marks obtained in the midterm exam and final exam.

Content
The course Mathematics 2 is the second part of the three semester basic training in higher mathematics. Topics are
- Riemann integral,
- n-dimensional vector spaces,
- scalar product, length and angle,
- linear mappings and matrices,
- determinants,
- eigenvalue theory,
- multivariate calculus.

Recommendation
There are no Prerequisites. We strongly recommend to attend the three maths courses in the order Mathematics 1, Mathematics 2, Mathematics 3.

Workload
work load: 210 hours (7 ECTS)
classes: 60 hours lectures + 30 hours exercises
6.52 Module: Mathematics 3 [M-MATH-101679]

Responsible: Prof. Dr. Günter Last
Organisation: KIT Department of Mathematics
Part of: Mathematics

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Mandatory

| T-MATH-102264 | Mathematics III - Final Exam | 7 CR | Folkers, Hug, Last, Winter |

Competence Certificate
The assessment consists of a written exams of 105 min (in accordance with §4(2), 1 of the examination regulations). The exam takes place shortly after the end of the lectures. Auxiliary means such as literature or calculators are allowed. A resit exam is offered in the first weeks of the subsequent semester.

Competence Goal
Students
• are confident with important concepts in the theory of normed vector spaces.
• have some basic knowledge of ordinary differential equations.
• have some basic knowledge of Fourier analysis.

Module grade calculation
The examination mark for Mathematics 3 is the mark of the written exam.

Content
The course Mathematics 3 is the third part of the three semester basic training in higher mathematics. Topics are
• Multiple integrals,
• Implicit functions,
• General linear spaces,
• Normed vector spaces,
• Banach's fixed point theorem,
• Ordinary differential equations,
• Linear differential equations,
• Fourier analysis,
• Integral transformations.

Workload
work load: 210 hours (7 ECTS)
classes: 60 hours lectures + 30 hours exercises
6.53 Module: Mechanical Design [M-MACH-101299]

**Responsible:** Prof. Dr.-Ing. Albert Albers
             Prof. Dr.-Ing. Sven Matthiesen

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
             Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
             Compulsory Elective Modules (Ingenieurwissenschaften)

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<tr>
<td>T-MACH-110363</td>
<td>Mechanical Design Basics I and II</td>
<td>7 CR</td>
<td>Albers, Matthiesen</td>
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<tr>
<td>T-MACH-110364</td>
<td>Mechanical Design Basics I, Tutorial</td>
<td>1 CR</td>
<td>Albers, Matthiesen</td>
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<td>T-MACH-110365</td>
<td>Mechanical Design Basics II, Tutorial</td>
<td>1 CR</td>
<td>Albers, Matthiesen</td>
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**Competence Certificate**

Written examination on the contents of Mechanical Design I & II

Duration: 90 min plus reading time

Preliminary examination: Successful participation in the preliminary work in the field of Mechanical Design I & II
Competence Goal

Learning object springs:
- be able to recognize spring types and explain stress
- Identify and describe the properties of a resilient LSS in machine elements presented later on
- Understanding and explaining the principle of action
- Know and list areas of application for springs
- graphically illustrate the load and the resulting stresses
- be able to describe the degree of species usefulness as a means of lightweight construction
- be able to analyse different solution variants with regard to lightweight construction (use species efficiency)
- Being able to explain several springs as a circuit and calculate total spring stiffness

Learning objects Technical Systems:
- Being able to explain what a technical system is
- “Thinking in systems.”
- Using system technology as an abstraction tool for handling complexity
- Recognizing functional relationships of technical systems
- Getting to know the concept of function
- be able to use C&C²-A as a means of system technology

Learning objects Visualization:
- Ability to create and interpret schematics
- Using freehand technical drawing as a means of communication
- To be able to apply the technical basics of freehand drawing
- Derivation of 2D representations into different perspective representations of technical structures and vice versa
- Master reading of technical drawings
- Dedicated dimensioning of technical drawings
- Create sectional views of technical systems as a technical sketch

Learning objects Bearings:
- be able to recognize bearings in machine systems and explain their basic functions
- name bearings (type/type/function) and recognize them in machine systems and technical drawings
- Being able to name areas of application and selection criteria for the various bearings and bearing arrangements and explain interrelationships
- Ability to functionally explain the design of the bearing definitions in different directions radially/axially and circumferentially
- Know and describe selection as an iterative process as an example
- be able to perform dimensioning of bearing arrangements as an example of the engineer's approach to dimensioning machine elements
- Develop first ideas for probabilities in predicting the life of machine elements
- Recognise from the damage pattern whether static or dynamic overload was the cause of material failure
- Calculate equivalent static and dynamic bearing loads from the catalogue and given external forces on the bearing
- Being able to name, explain and transfer the basic equation of the dimensioning to the bearing dimensioning

Learning objectives seals:
The students…
- can discuss the basic functions of seals
- can describe the physical causes for mass transfer
- can apply the C&C-Model on seals
- can name, describe and apply the three most important classification criteria of seals
- can explain the function of a contacting seal and a non-contacting seal.
- can differentiate the seal types and organize them to the classification criteria.
- can discuss the structure and the effect of a radial shaft seal
- can evaluate radial shaft seals, compression packings, mechanical seals, gap seals and labyrinth seals
- can describe and apply the constructional principle of selffortification
- can describe the stick-slip phenomenon during the movement sequences of a reciprocating seal

Learning design:
The students…
- understand the meaning of design
- are able to recognize and implement basic rules and principles of design
- are able to design the connection of partial systems into the total system
- can name requirements of design and take them into account
- know the main groups of manufacturing methods
• are able to explain the manufacturing processes
• are able to depict a casted design in a drawing clearly, e.g. draft of the mold, no material accumulation, ...
• know how components are designed
• Know how the production of the components has an effect on
• their design
• Know the requirements and boundary conditions on design

Learning bolted connections:
The students...
• can list and explain various bolt applications.
• can recognize bolt types and explain their function
• can build a C&C² model of a bolted joint and discuss the influences on its function
• can explain the function of a bolted connection with the help of a spring model
• can reproduce, apply and discuss the screw equation.
• Can estimate the load-bearing capacity of low-loaded bolted joints for dimensioning purposes
• Can indicate which bolted joint is to be calculated and which only roughly dimensioned.
• Can carry out the dimensioning of bolted connections as flange connections
• Can create, explain and discuss the force deflection diagram of a bolted connection

Prerequisites
None

Content
MKL I:
Introduction to product development
Tools for visualization (technical drawing)
Product creation as a problem solution
Technical Systems Product Development
• Systems theorie
• Contact and Channel Approach C&C²-A

Basics of selected construction and machine elements
• Federn
• bearings and fence
• sealings

The lecture is accompanied by exercises with the following content:
gear workshop
Tools for visualization (technical drawing)
Technical Systems Product Development
• Systemtheorie
• Contact and Channel Approach C&C²-A

Exercises for springs
Exercises for bearings and fence

MKL II:
• sealings
• design
• dimensioning
• component connections
• bolts

Recommendation
An in-depth study of machine design (parts 3 + 4) can be carried out as part of the "Extracurricular Module in Engineering".
Workload
MKL1:
Attendance at lectures (15 VL): 22.5h
Presence exercises (8 exercises): 12h
Attendance (3x 2h) and preparation (3x3h) Workshop sessions: 15h
Preparation and execution of online test: 6h
Personal preparation and follow-up of lecture and exercise: 34.5h MKL1:
MKL2:
Attendance lectures (15 VL): 22.5h
Presence exercises (7 ÜB): 10.5h
Personal preparation and follow-up of lecture and exercise, incl. prerequisite and preparation for the exam: 117h

Learning type
Lecture
Tutorial
Project work during the semester
Online-test
6.54 Module: Methodical Foundations of OR [M-WIWI-101414]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Operations Research (Vertiefungsprogramm Operations Research)  
 Compulsory Elective Modules (Operations Research)

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**Election block: Wahlpflichtangebot (at least 1 item as well as between 4,5 and 9 credits)**

| T-WIWI-102726 | Global Optimization I | 4.5 CR | Stein |
| T-WIWI-103638 | Global Optimization I and II | 9 CR | Stein |
| T-WIWI-102724 | Nonlinear Optimization I | 4.5 CR | Stein |
| T-WIWI-103637 | Nonlinear Optimization I and II | 9 CR | Stein |

**Election block: Ergänzungsangebot ()**

| T-WIWI-106546 | Introduction to Stochastic Optimization | 4.5 CR | Rebennack |
| T-WIWI-102727 | Global Optimization II | 4.5 CR | Stein |
| T-WIWI-102725 | Nonlinear Optimization II | 4.5 CR | Stein |
| T-WIWI-102704 | Facility Location and Strategic Supply Chain Management | 4.5 CR | Nickel |

**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- names and describes basic notions for optimization methods, in particular from nonlinear and from global optimization,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve also challenging optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions.

**Prerequisites**

At least one of the courses Nonlinear Optimization I [2550111] and Global Optimization I [2550134] has to be examined.

**Content**

The modul focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous decision variables. The lectures on nonlinear programming deal with local solution concepts, whereas the lectures on global optimization treat approaches for global solutions.

**Recommendation**

The courses Introduction to Operations Research I and II are helpful.

**Annotation**

The planned lectures and courses for the next three years are announced online (http://www.ior.kit.edu).

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Microsystem Technology [M-MACH-101287]

**Responsible:** Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

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**Election block: Mikrosystemtechnik (at least 9 credits)**

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<td>T-MACH-102165</td>
<td>Selected Topics on Optics and Microoptics for Mechanical Engineers</td>
<td>3 CR</td>
<td>Mappes</td>
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<tr>
<td>T-MACH-100967</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II</td>
<td>3 CR</td>
<td>Guber</td>
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<td>T-MACH-100968</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III</td>
<td>3 CR</td>
<td>Guber</td>
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<tr>
<td>T-MACH-102172</td>
<td>Bionics for Engineers and Natural Scientists</td>
<td>3 CR</td>
<td>Hölscher</td>
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<tr>
<td>T-MACH-105182</td>
<td>Introduction to Microsystem Technology I</td>
<td>3 CR</td>
<td>Badili, Jouda, Korvink</td>
</tr>
<tr>
<td>T-MACH-105183</td>
<td>Introduction to Microsystem Technology II</td>
<td>3 CR</td>
<td>Jouda, Korvink</td>
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<tr>
<td>T-MACH-101910</td>
<td>Microactuators</td>
<td>3 CR</td>
<td>Kohl</td>
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<td>T-MACH-102080</td>
<td>Nanotechnology with Clusterbeams</td>
<td>3 CR</td>
<td>Gspann</td>
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<td>T-MACH-102152</td>
<td>Novel Actuators and Sensors</td>
<td>4 CR</td>
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<td>T-ETIT-101907</td>
<td>Optoelectronic Components</td>
<td>4 CR</td>
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<td>T-MACH-100530</td>
<td>Physics for Engineers</td>
<td>6 CR</td>
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<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

Construction and production of e. g. mechanical, optical, fluidic and sensory microsystems.

**Prerequisites**

Successful passing of the corresponding modules of the basic program.

**Content**

The module offers courses in microsystem technology. Knowledge is imparted in various fields like basics in construction and production of e. g. mechanical, optical, fluidic and sensory microsystems.

**Workload**

270 hours
6.56 Module: Mobile Machines [M-MACH-101267]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
Compulsory Elective Modules (Ingenieurwissenschaften)

**Credits:** 12

**Language:** Deutsch

**Level:** 4

**Version:** 2

### Mandatory

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<td>T-MACH-105168</td>
<td>Mobile Machines</td>
<td>9 CR</td>
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**Election block: Mobile Arbeitsmaschinen (at least 3 credits)**

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<td>Fluid Power Systems</td>
<td>5 CR</td>
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<td>T-MACH-105307</td>
<td>Drive Train of Mobile Machines</td>
<td>4 CR</td>
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<td>T-MACH-105311</td>
<td>Design and Development of Mobile Machines</td>
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<td>T-MACH-108887</td>
<td>Design and Development of Mobile Machines - Advance</td>
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<td>T-MACH-102150</td>
<td>BUS-Controls</td>
<td>3 CR</td>
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<td>Fundamentals in the Development of Commercial Vehicles II</td>
<td>1.5 CR</td>
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**Competence Certificate**

The assessment is carried out as a general oral exam (according to Section 4(2), 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The examination is offered every semester. Re-examinations are offered at every ordinary examination date.

The overall grade of the module is the grade of the oral examination.

The assessment may be carried out as partial oral exams (according to Section 4(2), 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. In this case the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

The assessment procedures are described for each course of the module separately.

**Competence Goal**

The student

- knows and understands the basic structure of the machines
- masters the basic skills to develop the selected machines

**Prerequisites**

Knowledge in the field of fluid technology is assumed.

**Content**

In the module of Mobile Machines [WI4INGMB15] the students will learn the structure of the machines and deepen the knowledge of the subject for developing the machines. After conclusion the module the student will know the latest developments in mobile machines and is able to evaluate the concepts and the trends of developments. The module is practically orientated and supported by industry partners.

**Recommendation**

We recommend that you attend the Fluidpower [2114093] event before.

**Workload**

360 hours
Learning type

- Research-oriented teaching
- lectures
- exercises
6.57 Module: Mobility and Infrastructure [M-BGU-101067]

**Responsible:** Prof. Dr.-Ing. Ralf Roos

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

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<td>Roos, Vortisch</td>
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**Prerequisites**

none

**Recommendation**

For students from the KIT-Department of Economics and Management it is recommended to take part in the exercises.

**Annotation**

none
6.58 Module: Module Bachelor Thesis [M-WIWI-101601]

**Responsible:** Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften

**Organisation:** KIT Department of Economics and Management

**Part of:** Bachelor Thesis

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**Mandatory**

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<td>Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften</td>
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**Competence Certificate**

The Bachelor Thesis is a written exam which shows that the student can autonomously investigate a scientific problem in Industrial Engineering and Management. The Bachelor Thesis is described in detail in § 11 (SPO 2007) and § 14 (SPO 2015) of the examination regulation. The review is carried out:

- according to SPO 2007 by at least one examiner of the Department of Economics and Management, or, after approval by at least one examiner of another faculty. The examiner has to be involved in the degree programme. Involved in the degree programme are the persons that coordinate a module or a lecture of the degree programme.
- according to SPO 2015 by at least two examiners of the Department of Economics and Management.

The regular processing time takes three/six months (SPO 2007/SPO 2015). On a reasoned request of the student, the examination board can extend the processing time of a maximum of one month. If the Bachelor Thesis is not completed in time, this exam is "failed", unless the student is not being responsible (eg maternity leave).

With consent of the examiner the thesis can be written in English as well. Other languages require besides the consent of the examiner the approval of the examination board. The issue of the Bachelor Thesis may only returned once and only within the first month of processing time. A new topic has to be released within four weeks.

The overall grade of the module is the grade of the Bachelor Thesis.

**Competence Goal**

The student can independently work on a relevant topic in accordance with scientific criteria within the specified time frame.

He/she is in a position to research, analyze the information, abstract and identify basic principles and regulations from less structured information.

He/she reviews the task ahead, can select scientific methods and techniques and apply them to solve a problem or identify further potential. This is basically also done under consideration of social and/or ethical aspects.

He/she can interpret, evaluate and if required, graphically present the obtained results.

He/she is in a position to clearly structure a research paper and communicate in writing using the technical terminology.

**Prerequisites**

Prerequisites for admission to the Bachelor Thesis:

- according to SPO 2007: the student is in the 3rd Academic year (5th and 6th semester) and has not been completed at most one of the exams of the basic program.
- according to SPO 2015: A minimum of 120 credits must be earned. All module examinations of the basic program must be passed.

At the request of the student, the examination committee decides on exceptions to these regulations.

It is recommended to begin the Bachelor Thesis in the 5th or 6th Semester.

A written confirmation of the examiner about supervising the Bachelor’s Thesis is required.

Please pay regard to the institute specific rules for supervising a Bachelor Thesis.

The Bachelor Thesis has to contain the following declaration: "I hereby declare that I produced this thesis without external assistance, and that no other than the listed references have been used as sources of information. Passages taken literally or analogously from published or non published sources are marked as this." If this declaration is not given, the Bachelor Thesis will not be accepted.
Content
The Bachelor Thesis is the first major scientific work. The topic of the Bachelor Thesis will be chosen by the student themselves and adjusted with the examiner. The topic has to be related to Industrial Engineering and Management and has to refer to subject-specific or interdisciplinary problems.

Workload
The total workload for this module is approximately 360 hours. For further information see German version.
6.59 Module: Optimization under Uncertainty [M-WIWI-103278]

**Responsible:** Prof. Dr. Steffen Rebennack  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Operations Research (Vertiefungsprogramm Operations Research)  
Compulsory Elective Modules (Operations Research)

<table>
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<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
<th>Version</th>
</tr>
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<tbody>
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<td>Each term</td>
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**Election block: Wahlpflichtangebot (between 1 and 2 items)**

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<th>Course Title</th>
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<tr>
<td>T-WIWI-106546</td>
<td>Introduction to Stochastic Optimization</td>
<td>4.5 CR Rebennack</td>
</tr>
<tr>
<td>T-WIWI-106545</td>
<td>Optimization under Uncertainty</td>
<td>4.5 CR Rebennack</td>
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**Election block: Ergänzungsangebot (at most 1 item)**

<table>
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<th>Course Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102724</td>
<td>Nonlinear Optimization I</td>
<td>4.5 CR Stein</td>
</tr>
<tr>
<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management</td>
<td>4.5 CR Nickel</td>
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</table>

**Competence Certificate**  
The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.  
The assessment procedures are described for each course of the module separately.  
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**  
The student

- denominates and describes basic notions for optimization methods under uncertainty, in particular from stochastic optimization,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems under uncertainty and chooses the appropriate solution methods to solve also challenging optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions, in particular of stochastic optimization problems.

**Prerequisites**  
At least one of the courses *Introduction to Stochastic Optimization* and *Optimization approaches under uncertainty* has to be taken.

**Content**  
The module focuses on modeling and analyzing mathematical optimization problems where certain data is not fully present at the time of decision-making. The lectures on the introduction to stochastic optimization deal with methods to integrate distribution information into the mathematical model. The lectures on the optimization approaches under uncertainty offer alternative approaches such as robust optimization.

**Recommendation**  
Knowledge from the lectures “Introduction to Operations Research I” and “Introduction to Operations Research II” are helpful.

**Annotation**  
The curriculum, planned for three years in advance, can be found on the Internet at http://sop.ior.kit.edu/28.php.

**Workload**  
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
Module: Power Network [M-ETIT-102379]

**Responsible:** Dr.-Ing. Bernd Hoferer  
Prof. Dr.-Ing. Thomas Leibfried

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)  
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
Compulsory Elective Modules (Ingenieurwissenschaften)

<table>
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<th>Credits</th>
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<tbody>
<tr>
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**Mandatory**

<table>
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<tbody>
<tr>
<td>T-ETIT-101923</td>
<td>Electric Energy Systems</td>
<td>5 CR</td>
<td>Leibfried</td>
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<tr>
<td>T-ETIT-100830</td>
<td>Power Network</td>
<td>6 CR</td>
<td>Leibfried</td>
</tr>
</tbody>
</table>
6.61 Module: Product Lifecycle Management [M-MACH-101270]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
Compulsory Elective Modules (Ingenieurwissenschaften)

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<td>1 semester</td>
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**Election block: Product Lifecycle Management (Kernbereich) (1 item)**

<table>
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<tr>
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<th>Course Name</th>
<th>Credits</th>
<th>Responsible</th>
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</thead>
<tbody>
<tr>
<td>T-MACH-105147</td>
<td>Product Lifecycle Management</td>
<td>4 CR</td>
<td>Ovtcharova</td>
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</table>

**Election block: Product Lifecycle Management (2 items)**

<table>
<thead>
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<th>Course Name</th>
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<tbody>
<tr>
<td>T-MACH-102153</td>
<td>PLM-CAD Workshop</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-102181</td>
<td>PLM for Product Development in Mechatronics</td>
<td>4 CR</td>
<td>Eigner</td>
</tr>
<tr>
<td>T-MACH-102209</td>
<td>Information Engineering</td>
<td>3 CR</td>
<td>Ovtcharova</td>
</tr>
<tr>
<td>T-MACH-106744</td>
<td>Agile Product Innovation Management - Value-driven Planning of new Products</td>
<td>4 CR</td>
<td>Kläger</td>
</tr>
<tr>
<td>T-MACH-106457</td>
<td>I4.0 Systems platform</td>
<td>4 CR</td>
<td>Maier, Ovtcharova</td>
</tr>
<tr>
<td>T-MACH-102083</td>
<td>Integrated Information Systems for Engineers</td>
<td>4 CR</td>
<td>Ovtcharova</td>
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<tr>
<td>T-MACH-102155</td>
<td>Product, Process and Resource Integration in the Automotive Industry</td>
<td>4 CR</td>
<td>Mbang</td>
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<tr>
<td>T-MACH-102149</td>
<td>Virtual Reality Practical Course</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-102187</td>
<td>CAD-NX Training Course</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The students should:

- have basic knowledge about the challenges in product and process data management regarding the whole product lifecycle;
- have understanding about challenges and functional concepts of product lifecycle management;
- be able to rudimental operate common PLM/CAx/VR - systems,
- develop and present prototype solutions in teams of different domains.

**Prerequisites**

None

**Content**

Product Lifecycle Management (PLM), Generation and management of information, Architecture and functionality of information systems, Industry 4.0, CAx and VR-systems.

**Workload**

270 hours
6.62 Module: Public Finance [M-WIWI-101403]

**Responsible:** Prof. Dr. Berthold Wigger

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Economics (Vertiefungsprogramm Volkswirtschaftslehre)
- Compulsory Elective Modules (Volkswirtschaftslehre)

### Credits
<table>
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<tr>
<th>Election block: Wahlpflichtangebot (9 credits)</th>
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<tr>
<td>T-WIWI-102877 Introduction to Public Finance</td>
</tr>
<tr>
<td>T-WIWI-108711 Basics of German Company Tax Law and Tax Planning</td>
</tr>
<tr>
<td>T-WIWI-102739 Public Revenues</td>
</tr>
<tr>
<td>T-WIWI-109590 Public Sector Finance</td>
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**Competence Certificate**
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
See German version.

**Content**
As a branch of Economics, Public Finance is concerned with the theory and policy of the public sector and its interrelations with the private sector. It analyzes the economic role of the state from a normative as well as from a positive point of view. The normative view examines efficiency- and equity-oriented motives for government intervention and develops fiscal policy guidelines. The positive view explains the actual behavior of economic agents in public sector affairs. Special fields of Public Finance are public revenues, i.e. taxes and public debt, public expenditures for publicly provided goods, and welfare programs.

**Recommendation**
It is recommended to attend the course 2560129 after having completed the course 2560120.

**Annotation**
The course T-WIWI-102790 "Specific Aspects in Taxation" will no longer be offered in the module as of winter semester 2018/2019.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
6.63 Module: Rail System Technology [M-MACH-101274]

Responsible: Prof. Dr.-Ing. Peter Gratzfeld
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
Compulsory Elective Modules (Ingenieurwissenschaften)

Mandatory

<table>
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<th>Credits</th>
<th>Language</th>
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<tbody>
<tr>
<td>9</td>
<td>Deutsch</td>
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</table>

T-MACH-102143 Rail System Technology 9 CR Gratzfeld

Competence Certificate
Oral examination
Duration: ca. 45 minutes
No tools or reference materials may be used during the exam.

Competence Goal

- The students understand relations and interdependencies between rail vehicles, infrastructure and operation in a rail system.
- Based on operating requirements and legal framework they derive the requirements concerning a capable infrastructure and suitable concepts of rail vehicles.
- They recognize the impact of alignment, understand the important function of the wheel-rail-contact and estimate the impact of driving dynamics on the operating program.
- They evaluate the impact of operating concepts on safety and capacity of a rail system.
- They know the infrastructure to provide power supply to rail vehicles with different drive systems.
- The students learn the role of rail vehicles and understand their classification. They understand the basic structure und know the functions of the main systems. They understand the overall tasks of vehicle system technology.
- They learn functions and requirements of car bodies and judge advantages and disadvantages of design principles. They know the functions of the car body’s interfaces.
- They know about the basics of running dynamics and bogies.
- The students learn about advantages and disadvantages of different types of traction drives and judge, which one fits best for each application.
- They understand brakes from a vehicular and an operational point of view. They assess the fitness of different brake systems.
- They know the basic setup of train control management system and understand the most important functions.
- They specify and define suitable vehicle concepts based on requirements for modern rail vehicles.
Content

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, power networks, filling stations
8. History (optional)
9. Vehicle system technology: structure and main systems of rail vehicles
10. Car body: functions, requirements, design principles, crash elements, interfaces
11. Bogies: forces, running gears, axle configuration
12. Drives: vehicle with/without contact wire, dual-mode vehicle
13. Brakes: tasks, basics, principles, blending, brake control
14. Train control management system: definitions, networks, bus systems, components, examples
15. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons

Annotation
A bibliography is available for download (Ilias-platform).
The lectures can be attended in the same term.

Workload

1. Regular attendance: 42 hours
2. Self-study: 42 hours
3. Exam and preparation: 186 hours

Learning type
Lectures
### Module: Real Estate Management [M-WIWI-101466]

**Responsible:** Prof. Dr.-Ing. Thomas Lützkendorf  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)  
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
- Compulsory Elective Modules (Betriebswirtschaftslehre)

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<th>Duration</th>
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**Mandatory**

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<th>Recurrence</th>
<th>Student Tutor</th>
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<tbody>
<tr>
<td>T-WIWI-102744</td>
<td>Real Estate Management I</td>
<td>4.5 CR</td>
<td>Each term</td>
<td>Lützkendorf</td>
</tr>
<tr>
<td>T-WIWI-102745</td>
<td>Real Estate Management II</td>
<td>4.5 CR</td>
<td>Each term</td>
<td>Lützkendorf</td>
</tr>
</tbody>
</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- possesses an overview concerning the different facets and interrelationships within the real estate business, the important decision points in real estate lifecycle and the different views and interests of the actors concerned, and
- is capable of applying basic economic methods an procedures to problems within the real estate area.

**Prerequisites**

None

**Content**

The real estate business offers graduates very interesting jobs and excellent work- and advancement possibilities. This module provides an insight into the macroeconomic importance of this industry, discusses problems concerned to the administration of real estate and housing companies and provides basic knowledge for making decisions both along the lifecycle of a single building and the management of real estate portfolios. Innovative operating and financing models are illustrated, as well as the current development when looking at real estate as an asset-class.

This module is also suitable for students who want to discuss macroeconomic, business-management or financial problems in a real estate context.

**Recommendation**

The combination with the module Design Constructions and Assessment of Green Buildings is recommended.

Furthermore a combination with courses in the area of

- Finance
- Insurance
- Civil engineering and architecture (building physics, building construction, facility management)

is recommended.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
6.65 Module: Seminar Module [M-WIWI-101816]

**Responsible:** Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften

**Organisation:** KIT Department of Economics and Management

**Part of:** Compulsory Elective Modules (mandatory)

**Credits:** 3

**Language:** Deutsch

**Level:** 3

**Version:** 4

### Election block: Wahlpflichtangebot (3 credits)

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<tr>
<td>T-WIWI-103486</td>
<td>Seminar in Business Administration (Bachelor)</td>
<td>3 CR</td>
<td>Professorenschaft des Fachbereichs Betriebswirtschaftslehre</td>
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<tr>
<td>T-WIWI-103485</td>
<td>Seminar in Informatics (Bachelor)</td>
<td>3 CR</td>
<td>Professorenschaft des Fachbereichs Informatik</td>
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<tr>
<td>T-WIWI-108763</td>
<td>Seminar in Engineering Science Master (approval)</td>
<td>3 CR</td>
<td>Fachvertreter ingenieurwissenschaftlicher Fakultäten</td>
</tr>
<tr>
<td>T-MATH-102265</td>
<td>Seminar in Mathematics (Bachelor)</td>
<td>3 CR</td>
<td>Folkers, Last</td>
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<tr>
<td>T-WIWI-103488</td>
<td>Seminar in Operations Research (Bachelor)</td>
<td>3 CR</td>
<td>Nickel, Rebennack, Stein</td>
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<tr>
<td>T-INFO-101997</td>
<td>Seminar: Legal Studies I</td>
<td>3 CR</td>
<td>Dreier</td>
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<tr>
<td>T-WIWI-103489</td>
<td>Seminar in Statistics (Bachelor)</td>
<td>3 CR</td>
<td>Grothe, Schienle</td>
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<tr>
<td>T-WIWI-103487</td>
<td>Seminar in Economics (Bachelor)</td>
<td>3 CR</td>
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<tr>
<td>T-MACH-109062</td>
<td>Seminar Production Technology</td>
<td>3 CR</td>
<td>Fleischer, Lanza, Schulze</td>
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<tr>
<td>T-MACH-108737</td>
<td>Seminar Data-Mining in Production</td>
<td>3 CR</td>
<td>Lanza</td>
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</table>

### Competence Certificate

**SPO 2015:** The modul examination consists of one seminar (according to §4 (3), 3 of the examintaion regulation). A detailed description of the assessment is given in the specific course characterizaton.

**SPO 2007:** The modul examination consists of two seminars and of at least one key qualification (KQ) course (according to §4 (3), 3 of the examintaion regulation). As key qualification one of the following courses must be chosen: Academic Learning HoC (2-3 credits), Key Qualifikations ZAK (1-3 credits), Elective „Educational development for student teachers" (2-3 credits) or language courses SpZ. A detailed description of every singled assessment is given in the specific course characterizaton.

### Competence Goal

- Students are able to independently deal with a defined problem in a specialized field based on scientific criteria.
- They are able to research, analyze the information, abstract and derive basic principles and regularities from unstructured information.
- They can solve the problems in a structured manner using their interdisciplinary know-how.
- They know how to validate the obtained results.
- Finally, they are able to logically and systematically present the results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

### Prerequisites

All modules of the basic program should be completed. For further information see German version.

### Content

Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well. A detailed description of these qualifications is given in the section “Key Qualifications” of the module handbook.

Furthermore, the module also includes additional key qualifications provided by the KQ-courses.
Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
See German version.
Module: Sociology/Empirical Social Research [M-GEISTSOZ-101167]

Responsible: Prof. Dr. Gerd Nollmann
Organisation: KIT Department of Humanities and Social Sciences
Part of: Compulsory Elective Modules (Recht oder Soziologie)

Credits: 9
Language: Deutsch
Level: 3
Version: 2

### Mandatory

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<td>T-GEISTSOZ-109047</td>
<td>Analysis of Social Structures (WiWi)</td>
<td>3 CR</td>
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<tr>
<td>T-GEISTSOZ-109048</td>
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<td>Social Science B (WiWi)</td>
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<td></td>
<td>Nollmann</td>
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</table>

### Competence Goal

The student
- Gains theoretical and methodical knowledge of social processes and structures
- Is able to apply acquired knowledge practically
- Is able to present work results in a precise and clear way

### Content

This module offers students the possibility to get to know research problems and to answer these theoretically as well as empirically. For example: Who does earn how much in his job and why? How do subcultures emerge? Why are boys’ grades in school always worse than those of girls? Do divorces have negative influences on the development of children? How does mass consumption influence the individual? Is there a world society emerging? In addition, this module contains courses on sociological methods that are essential to answer such questions scientifically.

The lecture on social structure analysis gives an overview of large social structures such as the education system, labour market, institutions, demography, etc. for Germany and in international comparison. The content of the social research seminars is determined individually by the lecturers. Students are free to choose one seminar each for Social Research A/B.
6.67 Module: Specialization in Customer Relationship Management [M-WIWI-101422]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre) (Usage until 3/31/2020)  
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
Compulsory Elective Modules (Betriebswirtschaftslehre) (Usage until 3/31/2020)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>4,5</td>
<td>Deutsch</td>
<td>3</td>
<td>5</td>
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**Mandatory**

<table>
<thead>
<tr>
<th>T-WIWI-102597</th>
<th>Operative CRM</th>
<th>4,5 CR</th>
<th>Geyer-Schulz</th>
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**Election block: Ergänzungsangebot (1 item)**

<table>
<thead>
<tr>
<th>T-WIWI-109938</th>
<th>Digital Services</th>
<th>4,5 CR</th>
<th>Satzger, Weinhardt</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-100005</td>
<td>Competition in Networks</td>
<td>4,5 CR</td>
<td>Mitusch</td>
</tr>
</tbody>
</table>

**Competence Certificate**

This module will be offered for the last time in winter semester 2019/20.

The assessment is carried out as partial exams (according to Section 4(1), S. 2 2nd clause of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- knows the scientific methods (from business administration, statistics, informatics) which are most relevant for analytic CRM and he autonomously applies these methods to standard cases,
- gains an overview of the market for CRM software,
- designs, implements, and analyzes operative CRM processes in concrete application domains (e.g. campaign management, call center management, ...),
- is aware of the problems of protecting the privacy of customers and the implications of privacy law.

**Prerequisites**

It is only possible to choose this module in combination with the module CRM and Servicemanagement. The module is passed only after the final partial exam of CRM and Servicemanagement is additionally passed.

**Content**

In this module, analysis methods and techniques for the management and improvement of customer relations are presented. Furthermore, modelling, implementation, introduction, change, analysis and valuation of operative CRM processes are treated. Regarding the first part, we teach analysis methods and techniques suitable for the management and improvement of customer relations. For this goal we treat the principles of customer- and service-oriented management as the foundation of successful customer relationship management. In addition, we show how knowledge of the customer can be used for decision-making at an aggregate level (e.g. planning of sortiments, analysis of customer loyalty, ...). A basic requirement for this is the integration and collection of data from operative processes in a suitably defined data-warehouse in which all relevant data is kept for future analysis. The process of transferring data from the operative systems into the data warehouse is known as the ETL process (Extract / Transform / Load). The process of modelling a data-warehouse as well as the so-called extraction, transformation, and loading process for building and maintaining a data-warehouse are discussed in-depth. The data-warehouse serves as a base for flexible management reporting. In addition, various statistic methods (e.g. cluster analysis, regression analysis, stochastic models, ...) are presented which help in computing suitable key performance indicators or which support decision-making.

Regarding the operative part, we emphasize the design of operative CRM processes. This includes the modelling, implementation, introduction and change, as well as the analysis and evaluation of operative CRM processes. Petri nets and their extensions are the scientific foundation of process modelling. The link of Petri nets to process models used in industry as e.g. UML activity diagrams is presented. In addition, a framework for process innovation which aims at a radical improvement of key business processes is introduced. The following application areas of operative CRM processes are presented and discussed:

- Strategic marketing processes
- Operative marketing processes (campaign management, permission marketing, ...)
- Customer service processes (sales force management, field services, call center management, ...)

Industrial Engineering and Management B.Sc.
Module Handbook as of 23.08.2019

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**Workload**

The total amount of work for this module is approximately 270 hours (9 credits). The subdivision is based on the credits of the courses of the module.

The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam periods and the time that is required to achieve the objectives of the module as an average student with an average performance.
6.68 Module: Specialization in Production Engineering [M-MACH-101284]

**Responsible:** Prof. Dr.-Ing. Volker Schulze  
**Organisation:** KIT Department of Mechanical Engineering  

**Part of:**  
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)  
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)  
- Compulsory Elective Modules (Ingenieurwissenschaften)

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### Election block: Vertiefung der Produktionstechnik (at least 9 credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Language</th>
<th>Credits per Credit Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-MACH-110176</td>
<td>Digitalization from Production to the Customer in the Optical Industry</td>
<td>4 CR</td>
<td>Deutsch</td>
<td>4 CR Wawerla</td>
</tr>
<tr>
<td>T-MACH-105188</td>
<td>Integrative Strategies in Production and Development of High Performance Cars</td>
<td>4 CR</td>
<td>Deutsch</td>
<td>4 CR Schlichtenmayer</td>
</tr>
<tr>
<td>T-MACH-105783</td>
<td>Learning Factory &quot;Global Production&quot;</td>
<td>4 CR</td>
<td>Deutsch</td>
<td>4 CR Lanza</td>
</tr>
<tr>
<td>T-MACH-108878</td>
<td>Laboratory Production Metrology</td>
<td>4 CR</td>
<td>Deutsch</td>
<td>4 CR Häfner</td>
</tr>
<tr>
<td>T-MACH-110318</td>
<td>Product- and Production-Concepts for modern Automobiles</td>
<td>4 CR</td>
<td>Deutsch</td>
<td>4 CR Kienzle, Steegmüller</td>
</tr>
<tr>
<td>T-MACH-102107</td>
<td>Quality Management</td>
<td>4 CR</td>
<td>Deutsch</td>
<td>4 CR Lanza</td>
</tr>
<tr>
<td>T-MACH-105185</td>
<td>Control Technology</td>
<td>4 CR</td>
<td>Deutsch</td>
<td>4 CR Gönnheimer</td>
</tr>
<tr>
<td>T-MACH-105177</td>
<td>Metal Forming</td>
<td>3 CR</td>
<td>Deutsch</td>
<td>3 CR Herlan</td>
</tr>
<tr>
<td>T-MACH-102148</td>
<td>Gear Cutting Technology</td>
<td>4 CR</td>
<td>Deutsch</td>
<td>4 CR Klaiber</td>
</tr>
</tbody>
</table>

**Competence Certificate**

- Oral exams: duration approx. 5 min per credit point
- Written exams: duration approx. 20 - 25 min per credit point

Amount, type and scope of the success control can vary according to the individually choice.

**Competence Goal**

The students

- are able to apply the methods of production science to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques for a specific problem.
- are able to use their knowledge target-oriented to achieve an efficient production technology.
- are able to analyze new situations and choose methods of production science target-oriented based on the analyses, as well as justifying their selection.
- are able to describe and compare complex production processes exemplarily.

**Prerequisites**

none

**Content**

Within this module the students will get to know and learn about production science. Manifold lectures and excursions as part of several lectures provide specific insights into the field of production science.

**Workload**

The work load is about 270 hours, corresponding to 9 credit points.

**Learning type**

Lectures, seminars, workshops, excursions
6.69 Module: Statistics and Econometrics [M-WIWI-101599]

**Responsible:** Prof. Dr. Oliver Grothe  
Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management

**Part of:**  
- Economics (Vertiefungsprogramm Volkswirtschaftslehre)  
- Compulsory Elective Modules (Volkswirtschaftslehre)  
- Compulsory Elective Modules (Statistik)

<table>
<thead>
<tr>
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<th>Recurrence</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Each term</td>
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<td>3</td>
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</table>

**Election block: Wahlpflichtangebot (1 item)**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
<th>Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102736</td>
<td>Economics III: Introduction in Econometrics</td>
<td>5 CR</td>
<td>Schienle</td>
</tr>
<tr>
<td>T-WIWI-106623</td>
<td>Technical Conditions Met</td>
<td>0 CR</td>
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**Election block: Ergänzungsangebot (between 1 and 2 items)**

<table>
<thead>
<tr>
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<th>Course Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-103063</td>
<td>Analysis of Multivariate Data</td>
<td>4.5 CR</td>
<td>Grothe</td>
</tr>
<tr>
<td>T-WIWI-103066</td>
<td>Data Mining and Applications</td>
<td>4.5 CR</td>
<td>Nakhaeizadeh</td>
</tr>
<tr>
<td>T-WIWI-103064</td>
<td>Financial Econometrics</td>
<td>4.5 CR</td>
<td>Schienle</td>
</tr>
<tr>
<td>T-WIWI-103065</td>
<td>Statistical Modeling of Generalized Regression Models</td>
<td>4.5 CR</td>
<td>Heller</td>
</tr>
</tbody>
</table>

**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**

The student

- shows an advanced understanding of Econometric techniques and statistical model building.
- is able to develop Econometric models for applied problems based on available data
- is able to apply techniques and models with statistical software, to interpret results and to judge on different approaches with appropriate statistical criteria.

**Prerequisites**

The course „Economics III: Introduction in Econometrics“ is compulsory and must be examined. In case the course „Economics III: Introduction in Econometrics“ has already been examined within the module „Applied Microeconomics“, the course „Economics III: Introduction in Econometrics“ is not compulsory.

**Content**

The courses provide a solid Econometric and statistical foundation of techniques necessary to conduct valid regression, time series and multivariate analysis.

**Workload**

The total workload for this module is approximately 270 hours.
6.70 Module: Strategy and Organization [M-WIWI-101425]

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)
Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
Compulsory Elective Modules (Betriebswirtschaftslehre)

Election block: Strategie und Organisation (at least 9 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102630</td>
<td>Managing Organizations</td>
<td>3.5 CR</td>
<td>Lindstädt</td>
<td></td>
<td></td>
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<tr>
<td>T-WIWI-102871</td>
<td>Problem Solving, Communication and Leadership</td>
<td>2 CR</td>
<td>Lindstädt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-WIWI-102629</td>
<td>Management and Strategy</td>
<td>3.5 CR</td>
<td>Lindstädt</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Competence Certificate
Erfolgreicher Abschluss aller fachlich entsprechenden Module aus dem Grundlagenprogramm.

Competence Goal
- The student describes both central concepts of strategic management as well as concepts and models for the design of organizational structures.
- He / she evaluates the strengths and weaknesses of existing organizational structures and regulations on the basis of systematic criteria.
- The management of organizational changes discusses and examines the students by means of case studies to what extent the models can be used in practice and what conditions must apply to them.
- In addition, students plan to use IT to support corporate governance.

Content
The module has a practical and action-oriented structure and provides the student with an up-to-date overview of basic skills concepts and models of strategic management and a realistic picture of possibilities and limitations rational design approaches of the organization.

The focus is firstly on internal and external strategic analysis, concept and sources of competitive advantage, Formulation of competitive and corporate strategies as well as strategy assessment and implementation. Secondly strengths and weaknesses of organizational structures and regulations are assessed on the basis of systematic criteria. Concepts for the organization of organizational structures, the regulation of organizational processes and the control organizational changes are presented.

Workload
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
Module: Supply Chain Management [M-WIWI-101421]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)

Election block: Ergänzungsangebot (at most 4 items)

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<tr>
<th>Credits</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>T-WIWI-109936</td>
<td>Platform Economy</td>
<td>9</td>
<td>Each term</td>
<td>3</td>
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</tbody>
</table>

Competence Certificate

This module is only available in the elective field. In the specialization program Business Administration, the election is not permitted.

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal

The students

- are able to understand and evaluate the control of cross-company supply chains based on a strategic and operative view,
- are able to analyse the coordination problems within the supply chains,
- are able to identify and integrate adequate information system infrastructures to support the supply chains,
- are able to apply theoretical methods from the operations research and the information management,
- learn to elaborate solutions in a team

Prerequisites

The course T-WIWI-107506 “Platform Economy” has to be taken.

Content

The module “Supply Chain Management” gives an overview of the mutual dependencies of information systems and of supply chains spanning several enterprises. The specifics of supply chains and their information needs set new requirements for the operational information management. In the core lecture “Platform Economy” the focus is set on markets between two parties that act through an intermediary on an Internet platform. Topics discussed are network effects, peer-to-peer markets, blockchains and market design. The course is held in English and teaches parts of the syllabus with the support of a case study in which students analyze a platform.

The module is completed by an elective course addressing appropriate optimization methods for the Supply Chain Management and for modern logistic approaches.

Annotation

The planned lectures in the next terms can be found on the websites of the respective institutes IISM, IFL and IOR.

Workload

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
6.72 Module: Technical Logistics [M-MACH-101279]

**Responsible:** Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Mandatory**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tr>
<td>T-MACH-109919</td>
<td>Basics of Technical Logistics I</td>
<td>4 CR</td>
<td>Deutsch</td>
<td>3</td>
<td>3</td>
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<tr>
<td>T-MACH-109920</td>
<td>Basics of Technical Logistics II</td>
<td>5 CR</td>
<td>Deutsch</td>
<td>3</td>
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</table>

**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the requirement of credits of this module. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

T-MACH-109920 "Basics of Technical Logistics II" is based on T-MACH-109919 "Basics of Technical Logistics I". The contents are taught one after the other in one course in the winter semester. The individual exams are taken on one day at the end of the semester.

**Prerequisites**
none

**Content**
The module Technical Logistics provides in-depth basics on the main topics of technical logistics. The module focuses on technical characteristics of material handling technology. To gain a deeper understanding, the course is accompanied by exercises.

**Workload**
270 hours
6.73 Module: Topics in Finance I [M-WIWI-101465]

**Responsible:**
- Prof. Dr. Martin Ruckes
- Prof. Dr. Marliese Uhrig-Homburg

**Organisation:**
KIT Department of Economics and Management

**Part of:**
- Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre)

**Credits:** 9
**Recurrence:** Each term
**Duration:** 1 semester
**Level:** 3
**Version:** 7

<table>
<thead>
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<th>Election block: Wahlpflichtangebot (9 credits)</th>
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<tbody>
<tr>
<td>T-WIWI-102643</td>
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<tr>
<td>T-WIWI-109941</td>
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<tr>
<td>T-WIWI-107505</td>
</tr>
<tr>
<td>T-WIWI-102623</td>
</tr>
<tr>
<td>T-WIWI-102626</td>
</tr>
<tr>
<td>T-WIWI-108711</td>
</tr>
<tr>
<td>T-WIWI-102646</td>
</tr>
<tr>
<td>T-WIWI-110511</td>
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</tbody>
</table>

**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student
- has advanced skills in modern finance
- is able to apply these skills in practice in the fields of finance and accounting, financial markets and banking

**Prerequisites**
It is only possible to choose this module in combination with the module Essentials in Finance. The module is passed only after the final partial exam of Essentials in Finance is additionally passed.

In addition to that it is possible to choose the module Topics in Finance II.

**Content**
The module Topics in Finance I is based on the module Essentials of Finance. The courses deal with advanced issues concerning the fields of finance and accounting, financial markets and banking from a theoretical and practical point of view.

**Annotation**
The course T-WIWI-102790 "Specific Aspects in Taxation" will no longer be offered in the module as of winter semester 2018/2019.

**Workload**
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
6.74 Module: Topics in Finance II [M-WIWI-101423]

**Responsible:** Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Vertiefungsprogramm Betriebswirtschaftslehre)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre)

<table>
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<tr>
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<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Each term</td>
<td>1 semester</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

**Election block: Wahlpflichtangebot (9 credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Lecturer</th>
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</thead>
<tbody>
<tr>
<td>T-WIWI-102643</td>
<td>Derivatives</td>
<td>4.5 CR</td>
<td>Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-109941</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-102623</td>
<td>Financial Intermediation</td>
<td>4.5 CR</td>
<td>Ruckes</td>
</tr>
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<td>T-WIWI-107505</td>
<td>Financial Accounting for Global Firms</td>
<td>4.5 CR</td>
<td>Luedecke</td>
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<tr>
<td>T-WIWI-102626</td>
<td>Business Strategies of Banks</td>
<td>3 CR</td>
<td>Müller</td>
</tr>
<tr>
<td>T-WIWI-108711</td>
<td>Basics of German Company Tax Law and Tax Planning</td>
<td>4.5 CR</td>
<td>Gutekunst, Wigger</td>
</tr>
<tr>
<td>T-WIWI-102646</td>
<td>International Finance</td>
<td>3 CR</td>
<td>Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-110511</td>
<td>Strategic Finance and Technology Change</td>
<td>1.5 CR</td>
<td>Ruckes</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student
- has advanced skills in modern finance
- is able to apply these skills in practice in the fields of finance and accounting, financial markets and banking

**Prerequisites**
It is only possible to choose this module in combination with the module Essentials in Finance. The module is passed only after the final partial exam of Essentials in Finance is additionally passed.

In addition to that it is possible to choose the module Topics in Finance I.

**Content**
The module Topics in Finance II is based on the module Essentials of Finance. The courses deal with advanced issues concerning the fields of finance and accounting, financial markets and banking from a theoretical and practical point of view.

**Annotation**
The course T-WIWI-102790 "Special Taxation" will no longer be offered in the module as of winter semester 2018/1019.

**Workload**
The total workload for this module is approximately 270 hours.
### Module: Vehicle Development [M-MACH-101265]

**Responsible:** Prof. Dr. Frank Gauterin

**Organisation:** KIT Department of Mechanical Engineering

#### Part of:
- Engineering Sciences (Vertiefungsprogramm Ingenieurwissenschaften)
- Compulsory Elective Modules (Betriebswirtschaftslehre oder Ingenieurwissenschaften)
- Compulsory Elective Modules (Ingenieurwissenschaften)

<table>
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<tr>
<th>Credits</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Once</td>
<td>1 semester</td>
<td>Deutsch/Englisch</td>
<td>4</td>
<td>3</td>
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### Election block: Fahrzeugentwicklung (at least 9 credits)

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
<th>Responsible</th>
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</thead>
<tbody>
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<td>T-MACH-105156</td>
<td>Vehicle Mechatronics I</td>
<td>3 CR</td>
<td>Ammon</td>
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<td>Fundamentals in the Development of Commercial Vehicles I</td>
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<td>T-MACH-105162</td>
<td>Fundamentals of Automobile Development I</td>
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<td>Fundamentals of Automobile Development II</td>
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<td>Project Workshop: Automotive Engineering</td>
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<td>T-MACH-105172</td>
<td>Simulation of Coupled Systems</td>
<td>4 CR</td>
<td>Geimer, Xiang</td>
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<td>T-MACH-108888</td>
<td>Simulation of Coupled Systems - Advance</td>
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<td>Geimer, Xiang</td>
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</table>

### Competence Certificate

The assessment is carried out as partial exams (according to Section 4/2, 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

### Competence Goal

The student
- knows and understands the procedures in automobile development,
- knows and understands the technical specifications at the development procedures,
- is aware of notable boundaries like legislation.

### Prerequisites

None

### Content

By taking the module Vehicle Development the students get to know the methods and processes applied in the automobile industry. They learn the technical particularities which have to be considered during the vehicle development and it is shown how the numerous single components cooperate in a harmoniously balanced complete vehicle. There is also paid attention on special boundary conditions like legal requirements.

### Recommendation


### Workload

The total work load for this module is about 270 Hours (9 Credits). The partition of the work load is carried out according to the credit points of the courses of the module. The work load for courses with 6 credit points is about 180 hours, for courses with 4.5 credit points about 135 hours, for courses with 3 credit points about 90 hours, and for courses with 1.5 credit points about 45 hours. The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam duration and the time that is required to achieve the objectives of the module as an average student with an average performance.
Learning type
The teaching and learning procedures (lecture, lab course, workshop) are described for each course of the module separately.
7 Courses

7.1 Course: Advanced Lab Informatics [T-WIWI-103523]

Responsible: Prof. Dr. Andreas Oberweis
Prof. Dr. Harald Sack
Prof. Dr. Ali Sunyaev
Prof. Dr. York Sure-Vetter
Prof. Dr. Melanie Volkamer
Prof. Dr.-Ing. Johann Marius Zöllner

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101426 - Electives in Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

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<td>Praktikum Betriebliche Informationssysteme: Realisierung innovativer Dienste für Studierende</td>
<td>3 SWS</td>
<td>Practical course (P) Oberweis, Toussaint, Ullrich</td>
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<td>SS 2019</td>
<td>Knowledge Discovery and Data Mining</td>
<td>3 SWS</td>
<td>Sure-Vetter, Färber, Nguyen, Weller</td>
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<td>SS 2019</td>
<td>Data Science &amp; Real-time Big Data Analytics</td>
<td>2 SWS</td>
<td>Sure-Vetter, Riemer, Zehnder</td>
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<tr>
<td>WS 19/20</td>
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<td>Practical course (P) Baumgart, Volkamer, Mayer, Zarei</td>
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<td>WS 19/20</td>
<td>Business Information Systems: Realisation of innovative services</td>
<td>3 SWS</td>
<td>Practical course (P) Oberweis, Toussaint, Schüler, Schiefer</td>
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<tr>
<td>WS 19/20</td>
<td>Linked Data and the Semantic Web</td>
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<td>Sure-Vetter, Acosta Deibe, Käfer, Heling</td>
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<td>Projektpraktikum Information Service Engineering</td>
<td>2 SWS</td>
<td>Practical course (P) Sack</td>
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Competence Certificate
Advanced Lab "Privacy Friendly Apps":
The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of a practical work in which a software functionality must be implemented and three interim submissions of the software to be developed. The weighting of the individual components will be announced during the first meeting.

All other courses of the Institute AIFB:
The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of:
- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.
Prerequisites
None

Annotation
The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

Knowledge Discovery and Data Mining
2512300, SS 2019, 3 SWS, Language: Englisch, Open in study portal

Description
The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Notes
The exact dates and information for registration will be announced at the event page.

Learning Content
Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

Literature
Detailed references are indicated together with the respective subjects. For general background information look up the following textbooks:

- Mitchell, T.: Machine Learning

Data Science & Real-time Big Data Analytics
2513306, SS 2019, 2 SWS, Language: Deutsch/Englisch, Open in study portal

Description
Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Security
2512100, WS 19/20, 4 SWS, Language: Deutsch, Open in study portal

Practical course (P)

Notes
More information on https://ilias.studium.kit.edu/goto_produktiv_crs_998421.html

Linked Data and the Semantic Web
2512301, WS 19/20, 3 SWS, Language: Deutsch/Englisch, Open in study portal
Description
The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as 'Block-Seminar'.

Notes
The exact dates and information for registration will be announced at the event page.

Learning Content
Topics of interest include, but are not limited to:

- Travel Security
- Geo data
- Linked News
- Social Media

Real-World Challenges in Data Science and Analytics
2512311, WS 19/20, 3 SWS, Language: Deutsch/Englisch, Open in study portal

Notes
The exact dates and information for registration will be announced at the event page.

Sociotechnical Information Systems Development
2512400, WS 19/20, 3 SWS, Language: Deutsch/Englisch, Open in study portal

Description
The aim of this course is to provide a practical introduction into developing socio-technical information systems, such as web platforms, mobile apps, or desktop applications. Course participants will create (individually or in groups) software solutions for specific problems from various practical domains. The course tasks comprise requirements assessment, system design, and software implementation. Furthermore, course participants will gain insights into software quality assurance methods and software documentation.

Workload
4 ECTS = approx. 120 h

Praktikum Security, Usability and Society
2512551, WS 19/20, 3 SWS, , Open in study portal

Notes
Kick-off Meeting (compulsory attendance) on 18.10.2019 at 11:00 in room 3A-11.2

Projektpraktikum Information Service Engineering
2512600, WS 19/20, 2 SWS, Language: Englisch, Open in study portal
Description
The ISE project course is based on the summer semester lecture "Information Service Engineering". Goal of the course is to work on a research problem in small groups (3-4 students) related to the ISE lecture topics, i.e. Natural Language Processing, Knowledge Graphs, and Machine Learning. The solution of the given research problem requires the development of a software implementation.

The project will be worked on in teams of 3-4 students each, guided by a tutor from the teaching staff.

Required coursework includes:

- Mid term presentation (5-10 min)
- Final presentation (10-15 min)
- Course report (c. 20 pages)
- Participation and contribution of the students during the course
- Software development and delivery

Notes
The ISE project course can also be credited as a seminar.

The project will be worked on in teams of 3-4 students each, guided by a tutor from the teaching staff.
7 COURSES

Course: Advanced Lab Security [T-WIWI-109786]

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101426 - Electives in Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

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Events

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<td>4 SWS</td>
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Competence Certificate
The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of:

- a practical work
- a presentation and possibly
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites
None

Recommendation
Knowledge from the lecture "Information Security" is recommended.

Below you will find excerpts from events related to this course:

Security
2512100, WS 19/20, 4 SWS, Language: Deutsch, Open in study portal

Notes
More information on https://ilias.studium.kit.edu/goto_produktiv_crs_998421.html
### 7.3 Course: Advanced Lab Security, Usability and Society [T-WIWI-108439]

| Responsible: | Prof. Dr. Melanie Volkamer |
| Organisation: | KIT Department of Economics and Management |
| Part of: | M-WIWI-101426 - Electives in Informatics |

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**Competence Certificate**

The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of:

- a practical work
- a presentation and possibly
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

**Prerequisites**

None

**Recommendation**

Knowledge from the lecture "Information Security" is recommended.

**Annotation**

The course is expected to be offered from winter term 2018/2019.

**Contents:**

In the course of the programming lab, changing topics from the field of Human Factors in Security und Privacy will be worked on.

**Learning goals:**

The student

- can apply the basics of information security
- is able to implement appropriate measures to achieve different protection goals
- can structure a software project in the field of information security
- can use the Human Centred Security and Privacy by Design technique to develop user-friendly software
- can explain and present technical facts and the results of the programming lab in oral and written form

*Below you will find excerpts from events related to this course:*

**Praktikum Security, Usability and Society**

2512551, WS 19/20, 3 SWS, Open in study portal

**Notes**

Kick-off Meeting (compulsory attendance) on 18.10.2019 at 11:00 in room 3A-11.2
7 COURSES


Responsible: Prof. Dr. Melanie Volkamer

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101426 - Electives in Informatics
        M-WIWI-101628 - Emphasis in Informatics
        M-WIWI-101630 - Electives in Informatics

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Events

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Competence Certificate

The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of:

- a practical work
- a presentation and possibly
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites

None
7.5 Course: Advanced Programming - Application of Business Software [T-WIWI-102748]

**Responsible:** Prof. Dr. Stefan Klink  
Prof. Dr. Andreas Oberweis

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-101399 - Emphasis Informatics  
M-WIWI-105112 - Applied Informatics

**Type**  
Written examination

**Credits**  
4,5

**Recurrence**  
Each winter term

**Version**  
2

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**Events**

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<td>2511026</td>
<td>Advanced Programming - Application of Business Software</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
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<td>WS 19/20</td>
<td>2511027</td>
<td>Übungen zu Programmierung kommerzieller Systeme - Einsatz betrieblicher Standard-Software</td>
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<td>2511028</td>
<td>Rechnerübung zu Programmierung kommerzieller Systeme - Einsatz betrieblicher Standard-Software</td>
<td>2 SWS</td>
<td>Practice (Ü)</td>
<td>Ullrich, Schreiber</td>
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</table>

**Competence Certificate**
The assessment consists of a written examination of 2 hours (Section 4 (2), 1 of the examination regulations) and of assignments during the course (Section 4 (2), 3 SPO 2007 respectively Section 4 (3) SPO 2015).

Successful participation to the computer lab is precondition for permission to the assessment. Further information will be given at the first lesson and via the homepage of the course.

The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
This course cannot be taken together with Advanced Programming - Java Network Programming.

**Recommendation**
Knowledge of the course “Grundlagen der Informatik I und II” are helpful.

---

Below you will find excerpts from events related to this course:

**Advanced Programming - Application of Business Software**
2511026, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**
Business information systems enable, support, and accelerate new forms of business processes and forms of organisation. They are the central infrastructure of the economy in the age of eBusiness. Thus, basic knowledge is given in lectures, in excercises and in the computer lab which deals with installation, configuration and parameterization of business information systems. The course communicates profound knowledge in following topics:

- Analysis of cooperation scenarios and business process scenarios
- Selection of modelling methods according to defined criteria
- Implementation of business process models and cooperation models with the help of standard software
- Identification and assessment of challenges during the installation of information systems
- Economical evaluation of business information systems.
Workload
Lecture 30h
Exercise course 17h
Review and preparation of lectures 30h
Review and preparation of exercises 15h
Computer Lab 30h
Exam preparation 29h
Exam 1h
Total 150 h
Exercise courses are done by student tutors (size about 50 students)

Literature

Further literature will be given during the course.
7.6 Course: Advanced Programming - Java Network Programming [T-WIWI-102747]

**Responsible:** Prof. Dr. Dietmar Ratz

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101399 - Emphasis Informatics
- M-WIWI-105112 - Applied Informatics

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<td>SS 2019</td>
<td>2511021</td>
<td>Tutorium zu Programmierung kommerzieller Systeme - Anwendungen in Netzen mit Java</td>
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<td>Tutorial (Tu)</td>
<td>Ratz, Struppek, Ulrich</td>
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<td>SS 2019</td>
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<td>Rechnerpraktikum zu Programmierung kommerzieller Systeme - Anwendungen in Netzen mit Java</td>
<td>2</td>
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<td>Ratz, Struppek, Ulrich</td>
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</table>

**Competence Certificate**

At the end of the lecture period, a written examination (90 min.) (according to§4(2), 1 SPO) will be held for which admission must be granted during the semester after successful participation in the practices. The exact details will be announced in the lecture. The exam takes place every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

This course cannot be taken together with Advanced Programming - Application of Business Software [2511026].

**Annotation**

The registration for the participation in the computer lab (precondition for the exam participation) already takes place in the first lecture week!

Below you will find excerpts from events related to this course:

**Advanced Programming - Java Network Programming**

2511020, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**

In the lecture, the exercises and computer labs to this course the practical handling with the programming language Java dominating within the range of economical applications is obtained. The basis for this is the current language standard. The knowledge from the lecture Introduction to Programming with Java will be deepened and extended. This is done, among other things, by addressing commercially relevant topics such as object-oriented modeling and programming, class hierarchy and inheritance, threads, applications and applets, AWT and Swing components for graphical user interfaces, exception and event processing, lambda expressions, input/output via streams, applications in networks, Internet communication, client and server programming, remote method invocation, servlets, Java Server Pages and Enterprise Java Beans.

**Annotation**

The registration for the participation in the computer lab (precondition for the exam participation) already takes place in the first lecture week!

**Workload**

The total workload for this course is approximately 150 hours. For further information see German version.
**Literature**

**Elective literature:**
- Further references will be given in the lecture.
7 Course: Advanced Topics in Economic Theory [T-WIWI-102609]

**Responsible:** Prof. Dr. Kay Mitusch  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101501 - Economic Theory

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<td>Übung zu Advanced Topics in Economic Theory</td>
<td>1</td>
<td>Practice (Ü)</td>
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**Competence Certificate**

The course T-WIWI-102609 "Advanced Topics in Economic Theory" restarts in summer term 2019. The assessment consists of a written exam (60min) (following §4(2), 1 of the examination regulation) at the end of the lecture period or at the beginning of the following semester.

**Prerequisites**

None

**Recommendation**

This course is designed for advanced Master students with a strong interest in economic theory and mathematical models. Bachelor students who would like to participate are free to do so, but should be aware that the level is much more advanced than in other courses of their curriculum.

*Below you will find excerpts from events related to this course:*

**Advanced Topics in Economic Theory**

2520527, SS 2019, 2 SWS, Language: Englisch, [Open in study portal](#)

**Learning Content**

The course deals with basic elements of modern economic theory. It is divided into two parts. The first part introduces the microeconomic foundations of general equilibrium à la Debreu ("The Theory of Value", 1959) and Hildenbrand/Kirman ("Equilibrium Analysis",1988). The second part deals with asymmetric information and introduces the basic techniques of contract theory. The course is largely based on the textbook "Microeconomic Theory" (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Whinston, and J.R.Green.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

The course is based on the excellent textbook "Microeconomic Theory" (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Whinston, and J.R.Green.
7.8 Course: Agile Product Innovation Management - Value-driven Planning of new Products [T-MACH-106744]

Responsible:  Dr.-Ing. Roland Kläger
Organisation:  KIT Department of Mechanical Engineering

Part of:  M-MACH-101270 - Product Lifecycle Management

<table>
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<td>Each summer term</td>
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Events

| SS 2019 | 2122300 | Agile product innovation management - value-driven planning of new products | SWS | Lecture (V) | Kläger |

Competence Certificate

Oral examination, 20 min.

Prerequisites

None
7.9 Course: Analysis of Social Structures (WiWi) [T-GEISTSOZ-109047]

**Responsible:** Prof. Dr. Gerd Nollmann

**Organisation:** KIT Department of Humanities and Social Sciences

**Part of:** M-GEISTSOZ-101167 - Sociology/Empirical Social Research

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**Events**

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<tr>
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<td>2</td>
<td>Practice (Ü)</td>
<td>Each winter term</td>
<td>Nollmann</td>
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</table>

Industrial Engineering and Management B.Sc.
Module Handbook as of 23.08.2019
### 7.10 Course: Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines [T-MACH-105173]

**Responsible:** Dr.-Ing. Marcus Gohl  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101303 - Combustion Engines II

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<td>4</td>
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**Events**  
| SS 2019 | 2134150 | Analysis of Exhaust Gas und Lubricating Oil in Combustion Engines | 2 SWS | Lecture (V) | Gohl |

**Competence Certificate**  
Letter of attendance or oral exam (25 minutes, no auxiliary means)

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

#### Analysis of Exhaust Gas und Lubricating Oil in Combustion Engines  
2134150, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Description**  
**Media:**  
Lecture with Powerpoint slides

**Learning Content**  
The students get involved in the application of different measurement techniques in the field of exhaust gas and lubricating oil analysis. The functional principles of the systems as well as the application areas of the latter are discussed. In addition to a general overview of standard applications, current specific development and research activities are introduced.

**Workload**  
regular attendance: 24 hrs  
self study: 96 hrs

**Literature**  
The lecture documents are distributed during the courses.
7.11 Course: Analysis of Multivariate Data [T-WIWI-103063]

**Responsible:** Prof. Dr. Oliver Grothe  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101599 - Statistics and Econometrics

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**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. The exam is offered every semester. Re-examinations are offered only for repeaters.

**Prerequisites**
None

**Recommendation**
Attendance of the courses Statistics 1 [2600008] and Statistics 2 [2610020] is recommended.

**Annotation**
The lecture is not offered regularly. The courses planned for three years in advance can be found online.

Below you will find excerpts from events related to this course:

**Learning Content**
Multivariate Data  
Basics of multivariate estimating and testing  
Correlation Analysis  
Variance Analysis  
Factor- and Principal Component Analysis  
Discriminant function analysis  
Cluster Analysis

**Literature**
Comprehensive lecture notes
7.12 Course: Analysis Tools for Combustion Diagnostics [T-MACH-105167]

Responsible: Jürgen Pfeil
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101303 - Combustion Engines II

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Events

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<td>2 SWS</td>
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Competence Certificate
oral examination, Duration: 25 min., no auxiliary means

Prerequisites
none

Below you will find excerpts from events related to this course:

Analysis tools for combustion diagnostics
2134134, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Learning Content
energy balance at the engine
energy conversion in the combustion chamber
thermodynamics of the combustion process
flow velocities
flame propagation
special measurement techniques

Workload
regular attendance: 24 hours
self-study: 96 hours

Literature
Lecture notes available in the lectures
### Course: Applied Informatics – Applications of Artificial Intelligence [T-WIWI-110340]

**Responsible:** Prof. Dr. York Sure-Vetter  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101426 - Electives in Informatics  
- M-WIWI-105112 - Applied Informatics

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<td>1 SWS</td>
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**Competence Certificate**

Written Examination (60 min) according to §4, Abs. 2, 1 of the examination regulations or oral examination of 20 minutes according to §4, Abs. 2, 2 of the examination regulations. The exam takes place every semester and can be repeated at every regular examination date.

**Prerequisites**

None.

**Recommendation**

Basics in logic, e.g. from lecture Foundations of Informatics 1 are important.

**Annotation**

Replaces from winter semester 2019/2020 T-WIWI-109263 "Applications of Artificial Intelligence".

**Below you will find excerpts from events related to this course:**

### Applied Informatics – Applications of Artificial Intelligence

**2511314, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal**

**Lecture (V)**

**Description**

Applications of the AI is a sub-area of computer science dealing with the automation of intelligent behavior. In general, it is a question of mapping human intelligence. Methods of artificial intelligence are presented in various areas such as, for example, question answering systems, speech recognition and image recognition.

The lecture gives an introduction to the basic concepts of artificial intelligence. Essential theoretical foundations, methods and their applications are presented and explained.

**Learning Content**

This lecture aims to provide students with a basic knowledge and understanding of the structure, analysis and application of selected methods and technologies on artificial intelligence. The topics include, among others, knowledge modeling, machine learning, text mining, uninformed search, and intelligent agents.

**Workload**

- The total workload for this course is approximately 150 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 67.5 hours
- Exam and exam preparation: 37.5 hours
**Description**
Multiple exercises are held that capture the topics, held in the lecture Applications of AI and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

**Learning Content**
This lecture aims to provide students with a basic knowledge and understanding of the structure, analysis and application of selected methods and technologies on artificial intelligence. The topics include, among others, knowledge modeling, machine learning, text mining, uninformed search, and intelligent agents.

**Workload**
The total workload for the lecture Anwendungen der KI is given out on the description of the lecture.
7 COURSES


**Responsible:** Prof. Dr. Andreas Oberweis

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101426 - Electives in Informatics
- M-WIWI-105112 - Applied Informatics

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**Competence Certificate**
The assessment consists of a written exam (60 minutes) in the first week after lecture period.

**Modeled Conditions**
The following conditions have to be fulfilled:

1. The course T-WIWI-102660 - Database Systems must not have been started.

**Annotation**
Replaces from summer semester 2020 T-WIWI-102660 “Database Systems”.

**Below you will find excerpts from events related to this course:**

**Database Systems**
2511200, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**
Database systems (DBS) play an important role in today’s companies. Internal and external data is stored and processed in databases in every company. The proper management and organization of data helps to solve many problems, enables simultaneous queries from multiple users and is the organizational and operational base for the entire working procedures and processes of the company. The lecture leads in the area of the database theory, covers the basics of database languages and database systems, considers basic concepts of object-oriented and XML databases, conveys the principles of multi-user control of databases and physical data organization. In addition, it gives an overview of business problems often encountered in practice such as:

- Correctness of data (operational, semantic integrity)
- Restore of a consistent database state
- Synchronization of parallel transactions (phantom problem).

**Workload**
Lecture 30h
Exercise 15h

Preparation of lecture 30h
Preparation of exercises 30h
Exam preparation 44h
Exam & 1h

Total: 150h
Literature


Further literature will be given individually.
### 7.15 Course: Applied Informatics – Information Security [T-WIWI-110342]

**Responsible:** Prof. Dr. Melanie Volkamer  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
M-WIWI-101426 - Electives in Informatics  
M-WIWI-105112 - Applied Informatics

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**Events**

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<td>SS 2019</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
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</table>

**Competence Certificate**

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (30 min) following §4, Abs. 2, 2 of the examination regulation. The exam takes place every semester and can be repeated at every regular examination date.

**Modeled Conditions**

The following conditions have to be fulfilled:

1. The course T-WIWI-108387 - Information Security must not have been started.

**Annotation**

Replaces from summer term 2020 T-WIWI-108387 "Information Security".

**Below you will find excerpts from events related to this course:**

**Information Security**  
2511550, SS 2019, 2 SWS, [Open in study portal](#)  
Lecture (V)

**Description**

- Basics and concepts of information security  
- Understanding the protection objectives of information security and various attack models (including associated assumptions)  
- Introduction of measures to achieve the respective protection goals, taking into account different attack models  
- Note: In contrast to the IT Security lecture, measures such as encryption algorithms are treated only abstractly, i.e. the idea of the measure, assumptions to the attacker and the deployment environment.  
- Presentation and analysis of problems of information security arising from human-machine interaction and presentation of the Human Centered Security by Design approach.  
- Introduction into organisational protective measures and standards to be observed for companies

**Learning Content**

- Basics and concepts of information security  
- Understanding the protection objectives of information security and various attack models (including associated assumptions)  
- Introduction of measures to achieve the respective protection goals, taking into account different attack models  
- Note: In contrast to the IT Security lecture, measures such as encryption algorithms are treated only abstractly, i.e. the idea of the measure, assumptions to the attacker and the deployment environment.  
- Presentation and analysis of problems of information security arising from human-machine interaction and presentation of the Human Centered Security by Design approach.  
- Introduction into organisational protective measures and standards to be observed for companies.
Literature

7.16 Course: Applied Informatics – Modelling [T-WIWI-110338]

**Responsible:** Prof. Dr. Andreas Oberweis  
Prof. Dr. York Sure-Vetter

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-101426 - Electives in Informatics  
M-WIWI-105112 - Applied Informatics

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<td>Lecture (V)</td>
<td>Oberweis, Sure-Vetter, Schiefer</td>
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<td>WS 19/20</td>
<td>2511031</td>
<td>Exercises to Applied Informatics - Modelling</td>
<td>1</td>
<td>Practice (Ü)</td>
<td>Oberweis, Sure-Vetter, Schiefer, Käfer</td>
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</table>

**Competence Certificate**  
The assessment consists of a written examination (60 min) in the first week after lecture period (according to Section 4 (2), 1 of the examination regulation).

**Prerequisites**  
None

**Annotation**  
Replaces from winter semester 2019/2020 T-WIWI-102652 "Applied Informatics I - Modeling".

*Below you will find excerpts from events related to this course:*

**Applied Informatics - Modelling**

<table>
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<td>2 SWS</td>
<td>Lecture (V)</td>
<td>Oberweis, Sure-Vetter, Schiefer</td>
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</table>

**Description**  
In the context of complex information systems, modelling is of central importance, e.g. – in the context of systems to be developed – for a better understanding of their functionality or in the context of existing systems for supporting maintenance and further development.

Modelling, in particular modelling of information systems, forms the core part of this lecture. The lecture is organized in two parts. The first part mainly covers the modelling of static aspects, the second part covers the modelling of dynamic aspects of information systems.

**Learning Content**  
The lecture sets out with a definition of modelling and the advantages of modelling. After that, advanced aspects of UML, the Entity Relationship model (ER model) and description logics as a means of modelling static aspects will be explained. This will be complemented by the relational data model and the systematic design of databases based on ER models. For modelling dynamic aspects, different types of petri-nets together with their respective analysis techniques will be introduced.

**Workload**  
Total effort: 120-150 hours  
Presence time: 30 hours  
Self study: 90-120 hours
Literature


Additional literature:


Exercises to Applied Informatics - Modelling
2511031, WS 19/20, 1 SWS, Language: Deutsch, Open in study portal

Description
Multiple exercises are held that capture the topics, held in the lecture Applied Informatics I - Modelling, and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

Learning Content
The lecture sets out with a definition of modelling and the advantages of modelling. After that, advanced aspects of UML, the Entity Relationship model (ER model) and description logics as a means of modelling static aspects will be explained. This will be complemented by the relational data model and the systematic design of databases based on ER models. For modelling dynamic aspects, different types of petri-nets together with their respective analysis techniques will be introduced.

Workload
The total workload for the lecture Applied Informatics I - Modelling is given out on the description of the lecture.

Literature


Additional literature:


**Responsible:** Prof. Dr. Ali Sunyaev

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101426 - Electives in Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics
- M-WIWI-105112 - Applied Informatics

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**Events**

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<th>Applied Informatics II - Principles of Internet Computing: Foundations for Emerging Technologies and Future Services</th>
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<td>SS 2019</td>
<td>2511033</td>
<td>Übungen zu Angewandte Informatik II – Internet Computing</td>
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**Competence Certificate**

The assessment consists of a written exam (120 min) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is recommended for the written exam, which is offered at the end of the winter semester and at the end of the summer semester.

By successful processing the exercises a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

**Prerequisites**

None

**Annotation**

Replaces from winter semester 2019/2020 T-WIWI-109445 "Applied Informatics - Internet Computing".

*Below you will find excerpts from events related to this course:*

**Applied Informatics II - Principles of Internet Computing: Foundations for Emerging Technologies and Future Services**

Lecture (V)

2511032, SS 2019. 2 SWS, Language: Deutsch, Open in study portal

**Learning Content**

The lecture Applied Computer Science II provides insights into fundamental concepts and future technologies of distributed systems and Internet computing. Students should be able to select, design and apply the presented concepts and technologies. The course first introduces basic concepts of distributed systems (e.g. design of architectures for distributed systems, internet architectures, web services, middleware).

In the second part of the course, emerging technologies of Internet computing will be examined in depth. These include, among others:

- Cloud Computing
- Edge & Fog Computing
- Internet of Things
- Blockchain
- Artificial Intelligence

**Workload**

The total workload for this course is approximately 150 hours. For further information see German version.
Literature
Tba in the lecture.
### 7.18 Course: Applied Informatics – Software Engineering [T-WIWI-110343]

**Responsible:** Prof. Dr. Andreas Oberweis  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101426 - Electives in Informatics  
M-WIWI-105112 - Applied Informatics

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<td>2511207</td>
<td>Übungen zu Software Engineering</td>
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<td>Practice (Ü)</td>
<td>Oberweis, Fritsch</td>
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</table>

**Competence Certificate**

The assessment consists of an 1h written exam in the first week after lecture period.

**Modeled Conditions**

The following conditions have to be fulfilled:

1. The course T-WIWI-100809 - Software Engineering must not have been started.

**Annotation**


Below you will find excerpts from events related to this course:

### Software Engineering

2511206, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Lecture (V)**

**Learning Content**

The course deals with fundamental aspects of the systematically development of huge software systems. The course covers topics such as:

- software developing process models  
- methods and tools for the development phases: requirements analysis, system specification, system design, programming and testing.

**Workload**

- Lecture 30h  
- Exercise 15h  
- Review and Preparation of lectures 30h  
- Review and Preparation of exercises 15h  
- Exam preparation 29h  
- Exam 1h

Total: 120h

**Literature**


Further literature is given in the course.
7.19 Course: Auction & Mechanism Design [T-WIWI-102876]

Responsibility: Prof. Dr. Nora Szech
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101499 - Applied Microeconomics
M-WIWI-101501 - Economic Theory

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<td>Written examination</td>
<td>Each summer term</td>
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Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

A bonus can be earned through successful participation in the exercise. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites
None

Recommendation
Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

Annotation
The lecture will be held in English.

Below you will find excerpts from events related to this course:

V Auction and Mechanism Design
2560550, SS 2019, 2 SWS, Language: Englisch, Open in study portal

Learning Content
The course starts with the basic theory of equilibrium behavior and revenue management in one object standard auctions. The revenue equivalence theorem for standard auctions is introduced. Thereafter, the course focuses on mechanism design and its applications to one object auctions and bilateral trade.

Annotation
The lecture will be held in English.

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
7.20 Course: Automotive Engineering I [T-MACH-100092]

Responsible: Prof. Dr. Frank Gauterin  
Dr.-Ing. Hans-Joachim Unrau

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering

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<td>4 SWS</td>
<td>Lecture (V)</td>
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<td>Gauterin, Unrau</td>
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<td>Lecture (V)</td>
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<td>Gauterin, Gießler</td>
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</table>

Competence Certificate

Written examination

Duration: 120 minutes

Auxiliary means: none

Prerequisites

The brick "T-MACH-102203 - Automotive Engineering I" is not started or finished. The bricks "T-MACH-100092 - Grundlagen der Fahrzeugtechnik I" and "T-MACH-102203 - Automotive Engineering I" can not be combined.

Below you will find excerpts from events related to this course:

Automotive Engineering I

2113805, WS 19/20, 4 SWS, Language: Deutsch, Open in study portal

Lecture (V)

Learning Content

1. History and future of the automobile
2. Driving mechanics: driving resistances and driving performance, mechanics of longitudinal and lateral forces, active and passive safety
3. Drive systems: combustion engine, hybrid and electric drive systems
4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)
5. Power transmission and distribution: drive shafts, cardon joints, differentials

Workload

regular attendance: 45 hours
self-study: 195 hours

Literature

Automotive Engineering I
2113809, WS 19/20, 4 SWS, Language: Englisch, Open in study portal

Notes
In English language.

Learning Content
1. History and future of the automobile
2. Driving mechanics: driving resistances and driving performances, mechanics of longitudinal and lateral forces, active and passive safety
3. Drive systems: combustion engine, hybrid and electric drive systems
4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)
5. Power transmission and distribution: drive shafts, cardon joints, differentials

Workload
regular attendance: 45 hours
self-study: 195 hours

Literature
7.21 Course: Automotive Engineering I [T-MACH-102203]

**Responsible:** Prof. Dr. Frank Gauterin
Dr.-Ing. Martin Gießler

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101266 - Automotive Engineering

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<td>4 SWS</td>
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<td>Gauterin, Gießler</td>
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**Competence Certificate**

Written examination

**Duration:** 120 minutes

**Auxiliary means:** none

**Modeled Conditions**

The following conditions have to be fulfilled:

1. The course T-MACH-100092 - Automotive Engineering I must not have been started.

*Below you will find excerpts from events related to this course:*

**Automotive Engineering I**

2113809, WS 19/20, 4 SWS, Language: Englisch, [Open in study portal]

**Notes**

In English language.

**Learning Content**

1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performances, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5. Power transmission and distribution: drive shafts, cardon joints, differentials

**Workload**

regular attendance: 45 hours
self-study: 195 hours
Literature
7.22 Course: Automotive Engineering II [T-MACH-102117]

**Responsible:** Prof. Dr. Frank Gauterin  
Dr.-Ing. Hans-Joachim Unrau  

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101266 - Automotive Engineering

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**Competence Certificate**

Written Examination  
Duration: 90 minutes  
Auxiliary means: none

**Prerequisites**

none

Below you will find excerpts from events related to this course:

---

**Automotive Engineering II**  
2114835, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)  

**Learning Content**

1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices  
2. Steering elements: Manual steering, servo steering, steer by wire  
3. Brakes: Disc brake, drum brake, comparison of designs

**Workload**

regular attendance: 22.5 hours  
self-study: 97.5 hours

**Literature**


---

**Automotive Engineering II**  
2114855, SS 2019, 2 SWS, Language: Englisch, [Open in study portal](#)

**Notes**

In English language.
Learning Content

1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Manual steering, servo steering, steer by wire
3. Brakes: Disc brake, drum brake, comparison of the designs

Literature

Elective literature:

7.23 Course: Bachelor Thesis [T-WIWI-103067]

- **Responsible:** Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften
- **Organisation:** KIT Department of Economics and Management
- **Part of:** M-WIWI-101601 - Module Bachelor Thesis

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**Competence Certificate**
see module description

**Prerequisites**
see module description

**Final Thesis**
This course represents a final thesis. The following periods have been supplied:

- **Submission deadline** 6 months
- **Maximum extension period** 1 months
- **Correction period** 8 weeks
7.24 Course: Basic Principles of Economic Policy [T-WIWI-103213]

- **Responsible:** Prof. Dr. Ingrid Ott
- **Organisation:** KIT Department of Economics and Management
- **Part of:** M-WIWI-101668 - Economic Policy I

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**Competence Certificate**

The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

**Recommendation**

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2610012], and Economics II [2600014].

**Annotation**

**Description:**

Theory of general economic policy and discussion of current economic policy topics:

- Goals of economic policy,
- Instruments and institutions of economic policy,
- Triad of regional, national and European economic policies,
- special fields of economic policy, in particular growth, employment, provision of public infrastructure and climate policy.

**Learning objectives:**

Students learn:

- To apply basic concepts of micro- and macroeconomic theories to economic policy issues.
- To develop arguments on how state intervention in the market can be legitimized from a welfare economic perspective.
- To derive theory-based policy recommendations.

**Learning content:**

- Market interventions: microeconomic perspective
- Market interventions: macroeconomic perspective
- Institutional economic aspects
- Economic policy and welfare economics
- Economic policy makers: Political-economic aspects

**Workload:**

- Total effort at 4.5 LP: approx. 135 hours
- Presence time: approx. 30 hours
- Self-study: approx. 105 hours

**Media:**

See course announcement

**References:**

See course announcement
Below you will find excerpts from events related to this course:

**Basic Principles of Economic Policy**

**2560280, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)***

**Description**

Theory of general economic policy and discussion of current economic policy issues:

- Goals of economic policy,
- Instruments and institutions of economic policy,
- Triad of regional, national and European economic policies,
- Special fields of economic policy, in particular growth, employment, provision of public infrastructure and climate policy.

**Learning Content**

- Market interventions: microeconomic and macroeconomic perspective
- Institutional economic aspects
- Economic policy and welfare economics
- Economic policy makers: Political-economic aspects

**Workload**

- Total effort at 4.5 LP: approx. 135 hours
- Presence time: approx. 30 hours
- Self-study: approx. 105 hours

**Literature**

- Lecture slides
- Exercises

**Exercises of Basic Principles of Economic Policy**

**2560281, SS 2019, 1 SWS, Language: Deutsch, [Open in study portal](#)***

**Literature**

- Lecture slides
- Exercises
7.25 Course: Basics of German Company Tax Law and Tax Planning [T-WIWI-108711]

**Responsible:** Gerd Gutekunst
Prof. Dr. Berthold Wigger

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101403 - Public Finance
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101465 - Topics in Finance I

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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**
None

**Recommendation**
Knowledge of the collection of public revenues is assumed. Therefore it is recommended to attend the course “Öffentliche Einnahmen” beforehand.
7.26 Course: Basics of Technical Logistics I [T-MACH-109919]

**Responsible:** Dr.-Ing. Martin Mittwollen
Jan Oellerich

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101279 - Technical Logistics

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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**
none
### 7.27 Course: Basics of Technical Logistics II [T-MACH-109920]

**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101279 - Technical Logistics

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**Competence Certificate**  
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**  
none
Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II [T-MACH-100967]

Responsible: Prof. Dr. Andreas Guber
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101287 - Microsystem Technology

Type: Written examination
Credits: 3
Recurrence: Each summer term
Version: 2

Events
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<td>Lecture (V) Guber</td>
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Competence Certificate
Written exam (75 Min.)

Prerequisites
none

Below you will find excerpts from events related to this course:

BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II
2142883, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Description
Media:
Lecture script

Learning Content
Examples of use in Life-Sciences and biomedicine: Microfluidic Systems:
LabCD, Protein Crystallisation
Microarrays
Tissue Engineering
Cell Chip Systems
Drug Delivery Systems
Micro reaction technology
Microfluidic Cells for FTIR-Spectroscopy
Microsystem Technology for Anesthesia, Intensive Care and Infusion
Analysis Systems of Person’s Breath
Neurobionics and Neuroprosthesis
Nano Surgery

Workload
Literature: 20 h
Lessons: 21 h
Preparation and Review: 50 h
Exam preparation: 30 h

Literature
Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005
Buess, G.: Operationslehre in der endoskopischen Chirurgie, Band I und II; Springer-Verlag, 1994
M. Madou
Fundamentals of Microfabrication

Industrial Engineering and Management B.Sc.
Module Handbook as of 23.08.2019
**7.29 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III [T-MACH-100968]**

**Responsible:** Prof. Dr. Andreas Guber  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

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**Events**

| SS 2019 | 2142879 | BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III | 2 SWS | Lecture (V) | Guber |

**Competence Certificate**  
Written exam (75 Min.)

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

**BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III**  
2142879, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Description**

**Media:**
Lecture script

**Learning Content**
Examples of use in minimally invasive therapy  
Minimally invasive surgery (MIS)  
Endoscopic neurosurgery  
Interventional cardiology  
NOTES  
OP-robots and Endosystems  
License of Medical Products and Quality Management

**Workload**
Literature: 20 h  
Lessons: 21 h  
Preparation and Review: 50 h  
Exam preparation: 30 h

**Literature**
Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005  
Buess, G.: Operationslehre in der endoskopischen Chirurgie, Band I und II; Springer-Verlag, 1994  
M. Madou  
Fundamentals of Microfabrication
7 COURSES

Course: Bionics for Engineers and Natural Scientists [T-MACH-102172]

T 7.30 Course: Bionics for Engineers and Natural Scientists [T-MACH-102172]

Responsible: PD Dr. Hendrik Hölscher
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101287 - Microsystem Technology

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<th>Lecture (V)</th>
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Competence Certificate
written or oral exam

Prerequisites
none

Below you will find excerpts from events related to this course:

V Bionics for Engineers and Natural Scientists
2142140, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Description
Media:
Slides of the lectures

Learning Content
Bionics focuses on the design of technical products following the example of nature. For this purpose we have to learn from nature and to understand its basic design rules. Therefore, the lecture focuses on the analysis of the fascinating effects used by many plants and animals. Possible implementations into technical products are discussed in the end.

Workload
lectures 30 h
self study 30 h
preparation for examination 30 h

Literature
7 COURSES

7.31 Course: BUS-Controls [T-MACH-102150]

Responsible: Simon Becker
                  Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering
             M-MACH-101267 - Mobile Machines

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Competence Certificate
The assessment consists of an oral exam (20 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
Required for the participation in the examination is the preparation of a report during the semester. The partial service with the code T-MACH-108889 must have been passed.

Recommendation
Basic knowledge of electrical engineering is recommended. Programming skills are also helpful.

The number of participants is limited. A registration is mandatory, the details will be announced on the webpages of the Institute of Vehicle System Technology / Institute of Mobile Machines. In case of too many applications, attendance will be granted based on pre-qualification.

Annotation
The students will get an overview of the theoretic and practical functioning of different bus systems.

After the practical oriented lessons the students will be able to visualize the communication structure of different applications, design basic systems and evaluate the complexity of programming of the complete system.

Hereunto the students program in the practical orientated lessons IFM-controllers using the programming environment CoDeSys.

Content:
- Knowledge of the basics of data communication in networks
- Overview of the operating mode of current field buses
- Explicit observation of the operating mode and application areas of CAN buses
- Practical programming of an example application (hardware is provided)

Literature:

Below you will find excerpts from events related to this course:
Learning Content

- Knowledge of the basics of data communication in networks
- Overview of the operating mode of current field buses
- Explicit observation of the operating mode and application areas of CAN buses
- Practical programming of an example application (hardware is provided)

Annotation

The course will be replenished by interesting lectures of professionals.

Workload

- regular attendance: 21 hours
- self-study: 92 hours

Literature

Elective literature:

7 COURSES

7.32 Course: BUS-Controls - Advance [T-MACH-108889]

**Responsible:** Kevin Daiß
Prof. Dr.-Ing. Marcus Geimer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
M-MACH-101266 - Automotive Engineering
M-MACH-101267 - Mobile Machines

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**Competence Certificate**
Creation of control program

**Prerequisites**
none
### 7.33 Course: Business Administration: Finance and Accounting [T-WIWI-102819]

**Responsible:** Prof. Dr. Martin Ruckes  
Prof. Dr. Marliese Uhrig-Homburg  
Prof. Dr. Marcus Wouters

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101494 - Fundamentals of Business Administration 1

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**Events**

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<td>Business Administration: Finance and Accounting</td>
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**Competence Certificate**

The assessment consists of a written exam (90 min.) according to Section 4(2), 1 of the examination regulation. The assessment takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

**Annotation**

Key qualifications can be shown in an active participation through presentations of solutions and discussions in the tutorials which accompany the course. Each part of the course is taught by instructors specialised in the field of that part.

*Below you will find excerpts from events related to this course:*

#### Business Administration: Finance and Accounting

2610026, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**

- **Investment and Finance:**  
  - Valuation of Bonds and Stocks  
  - Capital Budgeting  
  - Portfolio Theory  
- **Financial Accounting**  
- **Management Accounting**

**Annotation**

Key qualifications can be shown in an active participation through presentations of solutions and discussions in the tutorials which accompany the course. Each part of the course is taught by instructors specialised in the field of that part.

**Workload**

The total workload for this course is approximately 120 hours. For further information see German version.

**Literature**

Extensive bibliographic information will be given in the materials to the lecture.
7.34 Course: Business Administration: Production Economics and Marketing [T-WIWI-102818]

Responsible:
Prof. Dr. Wolf Fichtner
Prof. Dr. Martin Klarmann
Prof. Dr.-Ing. Thomas Lützkendorf
Prof. Dr. Martin Ruckes
Prof. Dr. Frank Schultmann

Organisation:
KIT Department of Economics and Management

Part of:
M-WIWI-101578 - Fundamentals of Business Administration 2

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<td>Klarmann, Strych, Assistenten</td>
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<tr>
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<td>Lecture (V)</td>
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<td>Klarmann, Schultmann, Fichtner</td>
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Competence Certificate
The assessment consists of a written exam (90 minutes) according to Section 4(2), 1 of the examination regulation.

Prerequisites
None

Below you will find excerpts from events related to this course:

Business Administration: Production Economics and Marketing
2600024, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Description
1. Marketing:
Marketing is an organizational function to handle situations, activities, and processes for creating, communicating, and delivering value to customers in a best way. (Customer) relationship management comprises collecting, aggregating, and analyzing information (e.g., developments in the society, changing conditions of markets, alterations w.r.t. buying behavior) to benefit different target groups.

Main topics will deal with market research and optimized application of marketing mix instruments with emphasis on 'marketing and the web', 'innovation management', and 'international marketing'.

2. Production economics
In the part of production economics the student will learn basics in the field of production theory, procurement and resource acquisitions, production and operations management and industrial engineering.

Aspects of electrical engineering industry, technological foresights, construction industry and real estate markets will be treated.

3. Information systems
In today's economy, information is a competitive factor that calls for an interdisciplinary investigation from economics and business administration, informatics and law. In this part of the lecture, selected topics from information engineering and management and their impact in market competition are presented.

Topics include: Information in a company, Information processing: From an agent to business networks, social networks, service value networks, market engineering
Learning Content
The course is made up of the following topics:

Marketing
- Foundations of marketing
- Strategic marketing
- Consumer behaviour
- Product
- Price
- Promotion
- Sales
- Marketing Metrics

Production economics
In the part of production economics the student will learn basics in the field of production theory, procurement and resource acquisitions, production and operations management and industrial engineering.
Aspects of energy economics, technological foresights, construction industry and real estate markets will be treated.

Annotation
Key qualifications can be shown in an active participation through presentations of solutions and discussions in the tutorials which accompany the course.
Each part of the course is taught by instructors specialised in the field of that part.

Workload
The total workload for this course is approximately 120 hours. For further information see German version.

Literature
Further literature references are announced in the materials to the lecture.
7.35 Course: Business Administration: Strategic Management and Information Engineering and Management [T-WIWI-102817]

**Responsible:** Prof. Dr. Petra Nieken  
Prof. Dr. Martin Ruckes

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101494 - Fundamentals of Business Administration 1

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<td>2600023</td>
<td>Betriebswirtschaftslehre: Unternehmensführung und Informationswirtschaft</td>
<td>2 SWS</td>
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</table>

**Competence Certificate**

The assessment consists of a written exam (90 min.) according to Section 4(2), 1 of the examination regulation. The assessment takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None
7.36 Course: Business Strategies of Banks [T-WIWI-102626]

 Responsible: Prof. Dr. Wolfgang Müller
 Organisation: KIT Department of Economics and Management
 Part of: M-WIWI-101423 - Topics in Finance II
 M-WIWI-101465 - Topics in Finance I

<table>
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Events

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<td>2 SWS</td>
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</table>

Competence Certificate
See German version.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

Business Strategies of Banks
2530299, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Description
The management of a bank is in charge of the determination and implementation of business policy - taking into account all relevant endogenous and exogenous factors - that assures the bank's success in the long run. In this context, there exists a large body of banking models and theories which are helpful in describing the success and risk of a bank. This course is meant to be the bridging of banking theory and practical implementation. In the course of the lectures students will learn to take on the bank management's perspective.

The first chapter deals with the development of the banking sector. Making use of appropriate assumptions, a banking policy is developed in the second chapter. The design of bank services (ch. 3) and the adequate marketing plan (ch. 4) are then built on this framework. The operational business of banks must be guided by appropriate risk and earnings management (ch. 5 and 6), which are part of the overall (global) bank management (ch. 7). Chapter eight, at last, deals with the requirements and demands of bank supervision as they have significant impact on a bank's corporate policy.

Learning Content
The management of a bank is in charge of the determination and implementation of business policy - taking into account all relevant endogenous and exogenous factors - that assures the bank's success in the long run. In this context, there exists a large body of banking models and theories which are helpful in describing the success and risk of a bank. This course is meant to be the bridging of banking theory and practical implementation. In the course of the lectures students will learn to take on the bank management's perspective.

The first chapter deals with the development of the banking sector. Making use of appropriate assumptions, a banking policy is developed in the second chapter. The design of bank services (ch. 3) and the adequate marketing plan (ch. 4) are then built on this framework. The operational business of banks must be guided by appropriate risk and earnings management (ch. 5 and 6), which are part of the overall (global) bank management (ch. 7). Chapter eight, at last, deals with the requirements and demands of bank supervision as they have significant impact on a bank's corporate policy.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Elective literature:
- A script is disseminated chapter by chapter during the course of the lecture.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2000, Bankbetriebslehre, 6th edition, Springer
### Course: CAD-NX Training Course [T-MACH-102187]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101270 - Product Lifecycle Management

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<td>Completed coursework (practical)</td>
<td>2 SWS</td>
<td>Each term</td>
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**Competence Certificate**  
Practical examination on CAD computer, duration: 60 min.

**Prerequisites**  
None

**Recommendation**  
Dealing with technical drawings is required.

**Annotation**  
For the practical course compulsory attendance exists.

Below you will find excerpts from events related to this course:

### CAD-NX training course  
2123357, SS 2019, 3 SWS, Language: Deutsch, [Open in study portal]

**Learning Content**  
The participant will learn the following knowledge:

- Overview of the functional range
- Introduction to the work environment of NX
- Basics of 3D-CAD modelling
- Feature-based modelling
- Freeform modelling
- Generation of technical drawings
- Assembly modelling
- Finite element method (FEM) and multi-body simulation (MBS) with NX

**Annotation**  
For the practical course compulsory attendance exists.

**Workload**  
Regular attendance: 35 hours,  
Self-study: 12 hours

**Literature**  
Practical course skript
CAD-NX training course
2123357, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Learning Content
The participant will learn the following knowledge:

- Overview of the functional range
- Introduction to the work environment of NX
- Basics of 3D-CAD modelling
- Feature-based modelling
- Freeform modelling
- Generation of technical drawings
- Assembly modelling
- Finite element method (FEM) and multi-body simulation (MBS) with NX

Annotation
For the practical course compulsory attendance exists.

Workload
Regular attendance: 35 hours,
Self-study: 12 hours

Literature
Practical course skript
### 7.38 Course: Civil Law for Beginners [T-INFO-103339]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101187 - Elective Module Law

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**Events**

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<td>24012</td>
<td>Civil Law for Beginners</td>
<td>Matz</td>
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</table>
### 7.39 Course: Climatology [T-PHYS-101092]

**Responsible:**  
Prof. Dr. Joaquim José Ginete Werner Pinto  
Katharina Maurer

**Organisation:**  
KIT Department of Physics

**Part of:**  
M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1  
M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2  
M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<td>Übungen zu Klimatologie</td>
<td>1</td>
<td>Practice (Ü)</td>
<td>Ginete Werner Pinto, Ludwig. Mömken</td>
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</table>

**Prerequisites**

none
### Course: Combustion Engines I [T-MACH-102194]

**Responsible:** Prof. Dr. Thomas Koch  
Dr.-Ing. Heiko Kubach

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101275 - Combustion Engines I

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**Competence Certificate**
oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**
none

**Below you will find excerpts from events related to this course:**

#### Combustion Engines I

2133113, WS 19/20, 4 SWS, Language: Deutsch, [Open in study portal](#)

**Lecture / Practice (VÜ)**

**Notes**
Introduction, History, Concepts  
Working Principle and Applications  
Characteristic Parameters  
Engine Parts  
Drive Train  
Fuels  
Gasoline Engines  
Diesel Engines  
Exhaust Gas Aftertreatment

**Learning Content**
Introduction, History, Concepts  
Working Principle and Applications  
Characteristic Parameters  
Engine Parts  
Drive Train  
Fuels  
Gasoline Engines  
Diesel Engines  
Exhaust Gas Aftertreatment

**Workload**
regular attendance: 32 hours  
self-study: 88 hours
### Course: Combustion Engines II [T-MACH-104609]

**Responsible:** Dr.-Ing. Rainer Koch  
Dr.-Ing. Heiko Kubach  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101303 - Combustion Engines II

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**Events**

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<td>Lecture / Practice (VÜ)</td>
<td>Koch</td>
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**Competence Certificate**  
oral examination, duration: 25 minutes, no auxiliary means

**Prerequisites**  
none

**Recommendation**  
Fundamentals of Combustion Engines I helpful

*Below you will find excerpts from events related to this course:*

### Combustion Engines II

**2134151, SS 2019, 3 SWS, Language: Deutsch, Open in study portal**  

**Learning Content**

- Emissions
- Fuels
- Drive Train Dynamics
- Engine Parts
- Boosting
- Alternative Powertrain Concepts
- Special Engine Concepts
- Power Transmission

**Workload**

- regular attendance: 31.5 hours
- self-study: 90 hours
7 COURSES

Course: Competition in Networks [T-WIWI-100005]

7.42 Course: Competition in Networks [T-WIWI-100005]

| Responsible: | Prof. Dr. Kay Mitusch |
| Organisation: | KIT Department of Economics and Management |
| Part of:      | M-WIWI-101422 - Specialization in Customer Relationship Management |
|               | M-WIWI-101499 - Applied Microeconomics |
|               | M-WIWI-101668 - Economic Policy I |

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<td>Übung zu Wettbewerb in Netzen</td>
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<td>Wisotzky, Mitusch, Corbo</td>
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Competence Certificate

Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Prerequisites

None.

Recommendation

Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required.

Below you will find excerpts from events related to this course:

**Competition in Networks**

2561204, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Description**

Network or infrastructure industries like telecommunication, transport, and utilities form the backbone of modern economies. The lecture provides an overview of the economic characteristics of network industries. The planning of networks is complicated by the multitude of aspects involved (like spatial differentiation and the like). The interactions of different companies - competition or cooperation or both - are characterized by complex interdependencies within the networks: network effects, economies of scale, effects of vertical integration, switching costs, standardization, compatibility etc. appear increasingly in these sectors and even tend to appear in combination. Additionally, government interventions can often be observed, partly driven by the aims of competition policy and partly driven by the aims industrial policy. All these issues are brought up, analyzed formally (in part) and illustrated by several examples in the lecture.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

Will be announced in the lecture.
Course: Constitution and Properties of Wear resistant materials

**Responsible:** Prof. Dr. Sven Ulrich

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

**Type:** Oral examination

**Credits:** 4

**Recurrence:** Each summer term

**Version:** 2

**Events**

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<th>2 SWS</th>
<th>Lecture (V)</th>
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</table>

**Competence Certificate**

oral examination (about 30 min)

no tools or reference materials

**Prerequisites**

none

**Below you will find excerpts from events related to this course:**

**Constitution and Properties of Wear resistant materials**

2194643, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Lecture (V)**

**Notes**

The assessment consists of an oral exam (ca. 30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Teaching Content:

introduction

materials and wear

unalloyed and alloyed tool steels

high speed steels

stellites and hard alloys

hard materials

hard metals

ceramic tool materials

superhard materials

new developments

regular attendance: 22 hours

self-study: 98 hours

Basic understanding of constitution of wear-resistant materials, of the relations between constitution, properties and performance, of principles of increasing of hardness and toughness of materials as well as of the characteristics of the various groups of wear-resistant materials.
Learning Content
introduction
materials and wear
unalloyed and alloyed tool steels
high speed steels
stellites and hard alloys
hard materials
hard metals
ceramic tool materials
superhard materials
new developments

Workload
regular attendance: 22 hours
self-study: 98 hours

Literature
Schneider, J.: Schneidkeramik, Verlag moderne Industrie, Landsberg am Lech, 1995

Copies with figures and tables will be distributed
### 7.44 Course: Construction Technology [T-BGU-101691]

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<thead>
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#### Responsible:
Prof. Dr.-Ing. Shervin Haghsheno

#### Organisation:
KIT Department of Civil Engineering, Geo- and Environmental Sciences

#### Part of:
M-BGU-101004 - Fundamentals of Construction

#### Events

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<td>6200411</td>
<td>Exercises to Construction Technology</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
<td>Gentes, Haghsheno, Schneider, Waleczko</td>
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#### Competence Certificate
written exam with 90 minutes

#### Prerequisites
None

#### Recommendation
None

#### Annotation
None
7.45 Course: Control Technology [T-MACH-105185]

Responsible:  Christoph Gönnheimer
Organisation:  KIT Department of Mechanical Engineering

Part of:  M-MACH-101284 - Specialization in Production Engineering

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Events

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<td>SS 2019 2150683</td>
<td>2 SWS</td>
<td>Control Technology</td>
<td>Lecture (V)</td>
<td>Gönnheimer</td>
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</tbody>
</table>

Competence Certificate
Written Exam (60 min)

Prerequisites
none

Below you will find excerpts from events related to this course:

**Control Technology**
2150683, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Description

Media:

Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).
Notes
The lecture control technology gives an integral overview of available control components within the field of industrial production systems.
The first part of the lecture deals with the fundamentals of signal processing and with control peripherals in the form of sensors and actors which are used in production systems for the detection and manipulation of process states.
The second part handles with the function of electric control systems in the production environment. The main focus in this chapter is laid on programmable logic controls, computerized numerical controls and robot controls. Finally the course ends with the topic of cross-linking and decentralization with the help of bus systems.
The lecture is very practice-oriented and illustrated with numerous examples from different branches.
The following topics will be covered:

- Signal processing
- Control peripherals
- Programmable logic controls
- Numerical controls
- Controls for industrial robots
- Distributed control systems
- Field bus
- Trends in the area of control technology

Learning Outcomes:
The students ...

- are able to name the electrical controls which occur in the industrial environment and explain their function.
- can explain fundamental methods of signal processing. This involves in particular several coding methods, error protection methods and analog to digital conversion.
- are able to choose and to dimension control components, including sensors and actors, for an industrial application, particularly in the field of plant engineering and machine tools. Thereby, they can consider both, technical and economical issues.
- can describe the approach for projecting and writing software programs for a programmable logic control named Simatic S7 from Siemens. Thereby they can name several programming languages of the IEC 1131.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Learning Content
The lecture control technology gives an integral overview of available control components within the field of industrial production systems.
The first part of the lecture deals with the fundamentals of signal processing and with control peripherals in the form of sensors and actors which are used in production systems for the detection and manipulation of process states.
The second part handles with the function of electric control systems in the production environment. The main focus in this chapter is laid on programmable logic controls, computerized numerical controls and robot controls. Finally the course ends with the topic of cross-linking and decentralization with the help of bus systems.
The lecture is very practice-oriented and illustrated with numerous examples from different branches.
The following topics will be covered:

- Signal processing
- Control peripherals
- Programmable logic controls
- Numerical controls
- Controls for industrial robots
- Distributed control systems
- Field bus
- Trends in the area of control technology

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours
### 7.46 Course: Customer Relationship Management [T-WIWI-102595]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101460 - CRM and Service Management

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<td>2540508</td>
<td>Customer Relationship Management</td>
<td>2 SWS</td>
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<td>WS 19/20</td>
<td>2540509</td>
<td>Übung zu Customer Relationship Management</td>
<td>1 SWS</td>
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**Competence Certificate**  
Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.  
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**  
None

---

**Below you will find excerpts from events related to this course:**

### Customer Relationship Management  
2540508, WS 19/20, 2 SWS, Language: Englisch, [Open in study portal](#)  
**Lecture (V)**

**Learning Content**  
The course begins with an introduction into Service Management as the strategic concept which also covers all CRM applications. The course is divided in the basics of Service Management as well as different topics within this concept like external and internal marketing, quality management and organizational requirements.

**Workload**  
The total workload for this course is approximately 135 hours (4.5 credits):

**Time of attendance**
- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

**Self-study**
- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m

**Sum:** 135h 00m
Literature

Elective literature:
7.47 Course: Data Mining and Applications [T-WIWI-103066]

**Responsible:** Rheza Nakhaeizadeh  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101599 - Statistics and Econometrics

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<td>Data Mining and Applications</td>
<td>2/4 SWS</td>
<td>Lecture (V)</td>
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</table>

**Competence Certificate**

- Conduction of a larger empirical study in groups
- Reporting of milestones
- Final presentation (app. 45 minutes)

**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Data Mining and Applications**

2520375, SS 2019, 2/4 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**

Part one: Data Mining

**Why Data Mining?**

- What is Data Mining?  
- History of Data Mining  
- Conferences and Journals on Data Mining  
- Potential Applications  
- Data Mining Process:  
  - Business Understanding  
  - Data Understanding  
  - Data Preparation  
  - Modeling  
  - Evaluation  
  - Deployment  
  - Interdisciplinary aspects of Data Mining  
  - Data Mining tasks  
  - Data Mining Algorithms (Decision Trees, Association Rules, Regression, Clustering, Neural Networks)  
- Fuzzy Mining  
- OLAP and Data Warehouse  
- Data Mining Tools  
- Trends in Data Mining

Part two: Examples of application of Data Mining

- Success parameters of Data Mining Projects  
- Application in industry  
- Application in Commerce

**Workload**

The total workload for this course is approximately 135 hours. For further information see German version.
Literature


- Jiawei Han, Micheline Kamber, Data Mining: Concepts and Techniques, 2nd edition, Morgan Kaufmann, ISBN 1558609016, 2006.
- David J. Hand, Heikki Mannila and Padhraic Smyth, Principles of Data Mining, MIT Press, Fall 2000
- Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Addison wesley (May, 2005).
  Hardcover: 769 pages. ISBN: 0321321367
7.48 Course: Decision Theory [T-WIWI-102792]

**Responsible:** Prof. Dr. Karl-Martin Ehrhart

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101499 - Applied Microeconomics

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**Events**

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<td>2520366</td>
<td>Übungen zu Entscheidungstheorie</td>
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<td>Ehrhart</td>
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**Competence Certificate**

The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

**Prerequisites**

None

**Recommendation**

Knowledge in mathematics and statistics is required.

*Below you will find excerpts from events related to this course:*

### Decision Theory

**2520365, SS 2019, 2 SWS, Language: Deutsch, Open in study portal**  
**Lecture (V)**

**Description**

In the first part of the course we deal with problems of decision making under uncertainty and introduce models like expected utility theory, stochastic dominance, risk aversion, and prospect theory. We also consider the empirical validity of the different approaches.

In the second part the concepts learned in the first part are applied for example to search models and Bayesian games.

**Learning Content**

This course deals with problems of decision making particularly under uncertainty. We introduce the expected utility theory of Neumann/Morgenstern and the prospect theory of Kahnemann/Tversky and discuss the concepts of stochastic dominance, risk aversion, loss aversion, reference points etc. We also consider the empirical validity of the different approaches. Additionally, the lecture provides an introduction to the theory of findings (epistemology), particularly with respect to decision theory.

**Annotation**

The course “Decision Theory” [2520365] will not be offered any more in M.Sc. from winter term 2015/2016 on.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

- Ehrhart, K.-M. und S.K. Berninghaus (2012): Decision Theory, Script, KIT.
### Course: Derivatives [T-WIWI-102643]

**Responsible:** Prof. Dr. Marliese Uhrig-Homburg  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101402 - eFinance  
- M-WIWI-101423 - Topics in Finance II  
- M-WIWI-101465 - Topics in Finance I

#### Type
- Written examination  
- Credits: 4.5  
- Recurrence: Each summer term  
- Version: 1

#### Events
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#### Competence Certificate
The success control takes place in form of a written examination (75min.) (according to §4(2), 1 SPOs). Details on the structure of the success control may be announced during the lecture. The examination is offered every semester and can be repeated at any regular examination date.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

#### Prerequisites
None

#### Recommendation
None

Below you will find excerpts from events related to this course:

#### Derivatives

**2530550, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)**

**Lecture (V)**

**Description**
The lecture deals with the application areas and valuation of financial derivatives. After an overview of the most important derivatives and their relevance, forwards and futures are analysed. Then, an introduction to the Option Pricing Theory follows. The main emphasis is on option valuation in discrete and continuous time models. Finally, construction and usage of derivatives are discussed, e.g. in the context of risk management.

**Learning Content**
The lecture deals with the application areas and valuation of financial derivatives. After an overview of the most important derivatives and their relevance, forwards and futures are analysed. Then, an introduction to the Option Pricing Theory follows. The main emphasis is on option valuation in discrete and continuous time models. Finally, construction and usage of derivatives are discussed, e.g. in the context of risk management.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

**Elective literature:**
7.50 Course: Design and Development of Mobile Machines [T-MACH-105311]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer  
Jan Siebert

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101267 - Mobile Machines

**Type**  
Oral examination

**Credits**  
4

**Recurrence**  
Each winter term

**Version**  
1

### Events

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<td>WS 19/20</td>
<td>2113079</td>
<td>Design and Development of Mobile Machines</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
<td>Geimer, Siebert, Lehr, Geiger</td>
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</table>

### Competence Certificate

The assessment consists of an oral exam (20 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

A registration is mandatory, the details will be announced on the webpages of the Institute of Vehicle System Technology / Institute of Mobile Machines. In case of too many applications, attendance will be granted based on pre-qualification.

The course will be replenished by interesting lectures of professionals from leading hydraulic companies.

### Prerequisites

Required for the participation in the examination is the preparation of a report during the semester. The partial service with the code T-MACH-108887 must have been passed.

### Recommendation

Knowledge in Fluid Power Systems (LV 2114093)

### Annotation

After completion of the lecture, students can:

- design working and travel drive train hydraulics of mobile machines and can derive characteristic key factors.
- choose and apply suitable state of the art designing methods successfully
- analyse a mobile machines and break its structure down from a complex system to subsystems with reduced complexity
- identify and describe interactions and links between subsystems of a mobile machine
- present and document solutions of a technical problem according to R&D standards

The number of participants is limited.

### Content

The working scenario of a mobile machine depends strongly on the machine itself. Highly specialised machines, e.g. pavers are also as common as universal machines with a wide range of applications, e.g. hydraulic excavators. In general, all mobile machines are required to do their intended work in an optimal way and satisfy various criteria at the same time. This makes designing mobile machines a great and interesting challenge. Nevertheless, usually key factors can be derived for every mobile machine, which affect all other machine parameters. During this lecture, those key factors and designing mobile machines accordingly will be addressed. To do so, an exemplary mobile machine will be discussed and designed in the lecture an as a semester project.

### Literature

See German recommendations

Below you will find excerpts from events related to this course:
Learning Content
Wheel loaders and excavators are highly specialized mobile machines. Their function is to detach, pick up and deposit materials near by. Significant size for dimensioning of the machines is the content of their standard shovel. In this lecture the main steps in dimensioning a wheel loader or excavator are being thought. This includes among others:

- Defining the size and dimensions,
- the dimensioning of the drive train,
- Determining the kinematics of the equipment,
- the dimension of the working hydraulics and
- Calculations of strength

The entire design process of these machines is strongly influenced by the use of standards and guidelines (ISO/DIN-EN). Even this aspect is dealt with.

The lecture is based on the knowledge from the fields of mechanics, strength of materials, machine elements, propulsion and fluid technique. The lecture requires active participation and continued collaboration.

Workload
- regular attendance: 21 hours
- self-study: 99 hours

Literature
None.
7 COURSES

Course: Design and Development of Mobile Machines - Advance [T-MACH-108887]

7.51 Course: Design and Development of Mobile Machines - Advance [T-MACH-108887]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Jan Siebert

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101267 - Mobile Machines

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Competence Certificate
Preparation of semester report

Prerequisites
none
7.52 Course: Design and Operation of Power Transformers [T-ETIT-101925]

**Responsible:** Prof. Dr.-Ing. Thomas Leibfried  
Michael Schäfer

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-101165 - Energy Generation and Network Components

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7 COURSES

Course: Design, Construction and Sustainability Assessment of Buildings I [T-WIWI-102742]

7.53 Course: Design, Construction and Sustainability Assessment of Buildings I [T-WIWI-102742]

Responsible: Prof. Dr.-Ing. Thomas Lützkendorf
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101467 - Design, Construction and Sustainability Assessment of Buildings

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Events

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<td>WS 19/20</td>
<td>Übung zu Bauökologie I</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
<td>Worschech</td>
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Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (winter semester). Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
A combination with the module Real Estate Management and with engineering science modules in the area of building physics and structural design is recommended.

Below you will find excerpts from events related to this course:

Design and Construction of Buildings

2586404, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Description
Taking low-energy buildings as an example the course is an introduction to cheap, energy-efficient, resource-saving and health-supporting design, construction and operation of buildings. Questions of the implementation of the principles of a sustainable development within the building sector are discussed on the levels of the whole building, its components, building equipment as well as the materials. Besides technical interrelationships basics dimensioning and various approaches to ecological and economical assessment play a role during the lectures, as well as the different roles of people involved into the building process.

Topics are the integration of economical and ecological aspects into the design process, strategies of energy supply, low-energy and passive buildings, active and passive use of solar energy, selection and assessment of construction details, selection and assessment of insulation materials, greened roofs plus health and comfort.

Learning Content
Taking low-energy buildings as an example the course is an introduction to cheap, energy-efficient, resource-saving and health-supporting design, construction and operation of buildings. Questions of the implementation of the principles of a sustainable development within the building sector are discussed on the levels of the whole building, its components, building equipment as well as the materials. Besides technical interrelationships basics dimensioning and various approaches to ecological and economical assessment play a role during the lectures, as well as the different roles of people involved into the building process.

Topics are the integration of economical and ecological aspects into the design process, strategies of energy supply, low-energy and passive buildings, active and passive use of solar energy, selection and assessment of construction details, selection and assessment of insulation materials, greened roofs plus health and comfort.

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
Elective literature:
See german version.
Course: Design, Construction and Sustainability Assessment of Buildings II [T-WIWI-102743]

**Responsible:** Prof. Dr.-Ing. Thomas Lützkendorf

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101467 - Design, Construction and Sustainability Assessment of Buildings

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**Events**

| SS 2019 | 2585403 | Übung zu Bauökologie II | 1 SWS | Practice (Ü) | Ströbele |
| SS 2019 | 2585404 | Sustainability Assessment of Buildings | 2 SWS | Lecture (V) | Lützkendorf, Ströbele |

**Competence Certificate**

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (summer semester). Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

**Recommendation**

A combination with the module Real Estate Management and with engineering science modules from the areas building physics and structural design is recommended.

**Below you will find excerpts from events related to this course:**

**Sustainability Assessment of Buildings**

2585404, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

**Description**

The course identifies problems concerning the economical and environmental assessment of buildings along their lifecycle and discusses suitable procedures and tools supporting the decision making process. For example, the course addresses topics like operating costs, heat cost allocation, comparisons of heating costs, applied economical assessment methods, life cycle assessment as well as related design and assessment tools (e.g. element catalogues, databases, emblems, tools) and assessment procedures (e.g. carbon footprint, MIPS, KEA), which are currently available.

**Learning Content**

The course identifies problems concerning the economical and environmental assessment of buildings along their lifecycle and discusses suitable procedures and tools supporting the decision making process. For example, the course addresses topics like operating costs, heat cost allocation, comparisons of heating costs, applied economical assessment methods, life cycle assessment as well as related design and assessment tools (e.g. element catalogues, databases, emblems, tools) and assessment procedures (e.g. carbon footprint, MIPS, KEA), which are currently available.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

Elective literature:
See German version.
**Course: Digital Services [T-WIWI-109938]**

**Responsible:** Prof. Dr. Gerhard Satzger  
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-101422 - Specialization in Customer Relationship Management  
M-WIWI-101434 - eBusiness and Service Management  
M-WIWI-102752 - Fundamentals of Digital Service Systems  
M-WIWI-104911 - Information Systems & Digital Business: Platforms  
M-WIWI-104912 - Information Systems & Digital Business: Servitization

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**Events**

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<td>Practice (Ü)</td>
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**Competence Certificate**  
The assessment consists of a written exam (60 min) (§4(2), 1 of the examination regulations). By successful completion of the exercises (§4(2), 3 SPO 2007 respectively §4(3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

**Prerequisites**  
see below

**Annotation**  
This course replaces T-WIWI-105771 “Foundations of Digital Services A” as of winter semester 2019/2020. Students who wish to register for the examination in the summer semester 2019 please select the examination “Foundations of Digital Services A”.

**Below you will find excerpts from events related to this course:**

**Digital Services (formerly Foundations of Digital Services A)**  
2595466, SS 2019, 2 SWS, Language: Englisch, Open in study portal  
Lecture (V)

**Description**  
The world is moving more and more towards "service-led" economies: in developed countries services already account for around 70% of gross value added. In order to design, engineer, and manage services, traditional "goods-oriented" models are often inappropriate. In addition, the rapid development of information and communication technology (ICT) pushes the economic importance of services that are rendered electronically (eServices) and, thus, drives competitive changes: increased interaction and individualization open up new dimensions of "value co-creation" between providers and customers; dynamic and scalable service value networks replace static value chains; digital services can be globally delivered and exchanged across today's geographic boundaries; Building on a systematic categorization of (e)Services and on the general notion of "value co-creation", we cover concepts and foundations for engineering and managing IT-based services, allowing for further specialization in subsequent KSRI courses. Topics include service innovation, service economics, service modeling as well as the transformation and coordination of service value networks. In addition, case studies, hands-on exercises and guest lectures will illustrate the applicability of the concepts. English language is used throughout the course to acquaint students with international environments.
Learning Content
The world is moving more and more towards "service-led" economies: in developed countries services already account for around 70% of gross value added. In order to design, engineer, and manage services, traditional "goods-oriented" models are often inappropriate. In addition, the rapid development of information and communication technology (ICT) pushes the economic importance of services that are rendered electronically (eServices) and, thus, drives competitive changes: increased interaction and individualization open up new dimensions of "value co-creation" between providers and customers; dynamic and scalable service value networks replace static value chains; digital services can be globally delivered and exchanged across today's geographic boundaries;

Building on a systematic categorization of (e)Services and on the general notion of "value co-creation", we cover concepts and foundations for engineering and managing IT-based services, allowing for further specialization in subsequent KSRI courses. Topics include service innovation, service economics, service modeling as well as the transformation and coordination of service value networks.

In addition, case studies, hands-on exercises and guest lectures will illustrate the applicability of the concepts. English language is used throughout the course to acquaint students with international environments.

Annotation
Former title "Foundations of Digital Services A"

Workload
The total workload for this course is approximately 135 hours. For further information see German version.

Literature
- Teboul, (2007), Services is Front Stage.
Course: Digitalization from Production to the Customer in the Optical Industry [T-MACH-110176]

**Responsible:** Dr. Marc Wawerla  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

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**Competence Certificate**

Alternative test achievement (graded):
- Processing and presentation (ca. 15 min) of a case study with weighting 20%
- Oral exam (ca. 20 min) with weighting 80%

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Description**

The lecture deals with Digitalization along the entire value chain end-to-end, with a focus on production and supply chain. Within this context, concepts, tools, methods, technologies and concrete applications in the industry are presented. Furthermore, the students get the opportunity to get first-hand insights into the digitalization journey of a German technology company.

Main topics of the lecture:

- Concepts and methods such as disruptive innovation and agile project management
- Overview on technologies at disposal
- Practical approaches in innovation
- Applications in industry
- Field trip to ZEISS
Notes
The lecture deals with Digitalization along the entire value chain end-to-end, with a focus on production and supply chain. Within this context, concepts, tools, methods, technologies and concrete applications in the industry are presented. Furthermore, the students get the opportunity to get first-hand insights into the digitalization journey of a German technology company.

Main topics of the lecture:

- Concepts and methods such as disruptive innovation and agile project management
- Overview on technologies at disposal
- Practical approaches in innovation
- Applications in industry
- Field trip to ZEISS

Learning Outcomes:
The students ...

- are capable to comment on the content covered by the lecture.
- are able to analyze and evaluate the suitability of digitalization technologies in the optical industry.
- are able to assess the applicability of methods such as disruptive innovation and agile project management.
- are able to appreciate the practical challenges to digitalization in industry.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Workload
regular attendance: 21 hours
self-study: 99 hours
Course: Drive Train of Mobile Machines [T-MACH-105307]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer
Marco Wydra

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101267 - Mobile Machines

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<td>WS 19/20</td>
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**Competence Certificate**
The final assessment will be an oral examination (20 min) taking place during the recess period. The examination will be offered every semester and can be repeated at any regular examination date.

**Prerequisites**
none

**Recommendation**
- General principles of mechanics engineering
- Basic knowledge of hydraulics
- Interest in mobile machinery

**Annotation**
At the end of the lecture, participants can explain the structure and function of all discussed drive trains of mobile machines. They can analyze complex gearbox schematics and synthesize simple transmission functions using rough calculations.

**Content:**
In this course the different drive trains of mobile machinery will be discussed. The focus of this course is:

- mechanical gears
- torque converter
- hydrostatic drives
- power split drives
- electrical drives
- hybrid drives
- axles
- terra mechanics

**Media:** projector presentation

**Literature:** Download of lecture slides from ILIAS. Further literature recommendations during lectures.

Below you will find excerpts from events related to this course:

**Drive Train of Mobile Machines**
2113077, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

**Description**
**Media:**
projector presentation
Learning Content
In this course will be discussed the different drive train of mobile machineries. The focus of this course is:
- improve knowledge of fundamentals
- mechanical gears
- torque converter
- hydrostatic drives
- continuous variable transmission
- electrical drives
- hybrid drives
- axles
- terra mechanic

Workload
- regular attendance: 21 hours
- self-study: 89 hours

Literature
download of scriptum via ILIAS
Course: Economics and Behavior [T-WIWI-102892]

**Responsible:** Prof. Dr. Nora Szech

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101499 - Applied Microeconomics  
M-WIWI-101501 - Economic Theory

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**Competence Certificate**

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

A bonus can be earned through successful participation in the exercise. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**

None

**Recommendation**

Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

**Annotation**

The lecture will be held in English.

Below you will find excerpts from events related to this course:

**Economics and Behavior**

2560137, WS 19/20, 2 SWS, Language: Englisch, Open in study portal

**Learning Content**

The course covers topics from behavioral economics with regard to contents and methods. In addition, the students gain insight into the design of economic experiments. Furthermore, the students will become acquainted with reading and critically evaluating current research papers in the field of behavioral economics.

**Annotation**

The lecture will be held in English.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

### 7.59 Course: Economics I: Microeconomics [T-WIWI-102708]

**Responsible:** Prof. Dr. Clemens Puppe  
Pro. Dr. Johannes Philipp Reiß

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101398 - Introduction to Economics

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**Competence Certificate**

The assessment consists of a written exam (120 min) following §4, Abs. 2, 1 of the examination regulation. There may be offered a practice exam in the middle of the semester. The results of this exam may be used to improve the grade of the main exam. A detailed description of the examination modalities will be given by the respective lecturer.

The main exam takes place subsequent to the lecture. The re-examination is offered at the same examination period. As a rule, only repeating candidates are entitled for taking place the re-examination. For a detailed description on the exam regulations see the information of the respective chair.

**Prerequisites**

None

Below you will find excerpts from events related to this course:

#### Economics I: Microeconomics

**2610012, WS 19/20, 3 SWS, Language: Deutsch, Open in study portal**

**Description**

The students learn the basic concepts in Microeconomics and some basics in game theory. The student will understand the working of markets in modern economies and the role of decision making. Furthermore, she should be able to understand simple game theoretic argumentation in different fields of Economics.

In the two main parts of the course problems of microeconomic decision making (household behavior, firm behavior) and problems of commodity allocation on markets (market equilibria and efficiency of markets) as well are discussed. In the final part of the course basics of imperfect competition (oligopolistic markets) and of game theory are presented.

**Workload**

The total workload for this course is approximately 150 hours.

**Literature**

- Pindyck, Robert S./Rubinfeld, Daniel L., Mikroökonomie, 6. Aufl., Pearson, Münschen, 2005
7.60 Course: Economics II: Macroeconomics [T-WIWI-102709]

**Responsible:** Prof. Dr. Berthold Wigger

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101398 - Introduction to Economics

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**Competence Certificate**

The assessment consists of a written exam (120 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**

None

*Below you will find excerpts from events related to this course:*

**Economics II: Macroeconomics**

2600014, SS 2019, 4 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**

**Classical Theory of Macroeconomic Production**

Chapter 1: Gross domestic product

Chapter 2: Money and Inflation

Chapter 3: Open Economy I

Chapter 4: Unemployment

**Growth: The economy in the long term**

Chapter 5: Growth I

Chapter 6: Growth II

**Business cycle: The economy in the short term**

Chapter 7: Economy and aggregate demand I

Chapter 8: Economy and aggregate demand II

Chapter 9: Open Economy II

Chapter 10: Macroeconomic supply

**Advanced topics of macroeconomics**

Chapter 11: Dynamic model of the economy as a whole

Chapter 12: Microeconomic foundations

Chapter 13: Macroeconomic economic policy
Workload
Total effort for 5 credit points: approx. 150 hours
Presence time: 45 hours
Before and after the LV: 67.5 hours
Exam and exam preparation: 37.5 hours

Literature
This lecture is based on the well-known textbook "Macroeconomics" by Greg Mankiw from Schäffer Poeschel Verlag in the current version.
7.61 Course: Economics III: Introduction in Econometrics [T-WIWI-102736]

**Responsible:** Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101499 - Applied Microeconomics

**M-WIWI-101599 - Statistics and Econometrics**

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**Competence Certificate**

The assessment consists of an 1h written exam according to Section 4(2), 1 of the examination regulation.

**Prerequisites**

None

*Below you will find excerpts from events related to this course:*

**Economics III: Introduction in Econometrics**

2520016, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Lecture (V)**

**Learning Content**

Simple and multiple linear regression (estimating parameters, confidence interval, testing, prognosis, testing assumptions)

Multi equation models

Dynamic models

**Workload**

180 hours (6.0 Credits)

**Literature**

- Schneeweß: Ökonometrie ISBN 3-7908-0008-2

**Elective literature:**

Additional literature will be suggested in course
Below you will find excerpts from events related to this course:

### Competence Certificate
The assessment consists of a written exam (60 min) (§4(2), 1 of the examination regulations) and by submitting written essays as part of the exercise (§4(2), 3 SPO 2007 respectively §4(3) SPO 2015). 70% of the final grade is based on the written exam and 30% is based on assignments from the exercises. The points obtained in the exercises only apply to the first and second exam of the semester in which they were obtained.

### Prerequisites
see below

### Recommendation
None

### Description
The theoretical part of the course examines the New Institutions Economics which provides a theoretically found explanation for the existence of markets and intermediaries. Building upon the foundations of the market micro structure, several key parameters and factors of electronic trading are examined. These insights gained along a structured securities trading process are complemented and verified by the analysis of prototypical trading systems developed at the institute as well as selected trading systems used by leading exchanges in the world. In the more practical-oriented second part of the lecture, speakers from practice will give talks about financial trading systems and link the theoretical findings to real-world systems and applications.

### Learning Content
The theoretical part of the course examines the New Institutions Economics which provides a theoretically found explanation for the existence of markets and intermediaries. Building upon the foundations of the market micro structure, several key parameters and factors of electronic trading are examined. These insights gained along a structured securities trading process are complemented and verified by the analysis of prototypical trading systems developed at the institute as well as selected trading systems used by leading exchanges in the world. In the more practical-oriented second part of the lecture, speakers from practice will give talks about financial trading systems and link the theoretical findings to real-world systems and applications.

### Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature


Elective literature:

7.63 Course: Electric Energy Systems [T-ETIT-101923]

**Responsible:** Prof. Dr.-Ing. Thomas Leibfried

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-102379 - Power Network

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**Prerequisites**

none
# 7.64 Course: Electrical Engineering for Business Engineers, Part I [T-ETIT-100533]

**Responsible:** Dr. Wolfgang Menesklou  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101155 - Electrical Engineering

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### 7.65 Course: Electrical Engineering for Business Engineers, Part II [T-ETIT-100534]

**Responsible:** Dr. Wolfgang Menesklou  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:**  
- M-MACH-101261 - Emphasis in Fundamentals of Engineering  
- M-WIWI-101839 - Additional Fundamentals of Engineering  

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Industrial Engineering and Management B.Sc.  
Module Handbook as of 23.08.2019
Course: Empirical Finance [T-WIWI-110216]

**Responsible:** Prof. Dr Maxim Ulrich

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105035 - Empirical Finance

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**Competence Certificate**

The assessment consists of a written exam (90 minutes) according to §4(2) of the examination regulation.

**Prerequisites**

None.

Below you will find excerpts from events related to this course:

**Empirical Finance**

2500001, WS 19/20, 4 SWS, Language: Englisch, Open in study portal

**Description**

The aim of this course is to introduce the student to empirical data work in financial economics and investments. Students will learn and implement modern portfolio theory and the most important concepts to estimate expected returns and volatility.

**Learning Content**

The course covers several topics, among them:
- Mean-Variance Portfolio Optimization
- Modeling Distribution of Asset Returns: Factor Models, ARMA-GARCH
- Monte-Carlo Simulation
- Parameter Estimation with Maximum Likelihood and Regressions

**Workload**

The total workload for this course is approximately 180 hours.
### Course: Energy Conversion and Increased Efficiency in Internal Combustion Engines [T-MACH-105564]

**Responsible:** Prof. Dr. Thomas Koch  
Dr.-Ing. Heiko Kubach  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101275 - Combustion Engines I  

**Type** Oral examination  
**Credits** 4  
**Recurrence** Each winter term  
**Version** 1  

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**Competence Certificate**
oral exam, 25 minutes, no auxiliary means

**Prerequisites**
none

Below you will find excerpts from events related to this course:

### Energy Conversion and Increased Efficiency in Internal Combustion Engines
2133121, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Notes**
1. Introduction  
2. Thermodynamics of combustion engines  
3. Fundamentals  
4. gas exchange  
5. Flow field  
6. Wall heat losses  
7. Combustion in gasoline engines  
8. Pressure Trace Analysis  
9. Combustion in Diesel engines  
10. Waste heat recovery

**Learning Content**
1. Introduction  
2. Thermodynamics of combustion engines  
3. Fundamentals  
4. gas exchange  
5. Flow field  
6. Wall heat losses  
7. Combustion in gasoline engines  
8. Pressure Trace Analysis  
9. Combustion in Diesel engines  
10. Waste heat recovery
Workload
regular attendance: 24 hours, self-study: 96 hours
7.68 Course: Energy Policy [T-WIWI-102607]

**Responsible:** Prof. Dr. Martin Wietschel  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101464 - Energy Economics

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**Events**

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<td>2 SWS</td>
<td>Lecture (V)</td>
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**Competence Certificate**

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation.

**Prerequisites**

None.

*Below you will find excerpts from events related to this course:*

**Energy Policy**  
2581959, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Description**

The course deals with material and energy policy of policy makers and includes the effects of such policies on the economy as well as the involvement of industrial and other stakeholders in the policy design. At the beginning the neoclassical environment policy is discussed. Afterwards the Sustainable Development concept is presented and strategies how to translate the concept in policy decision follows. In the next part of the course an overview about the different environmental instruments classes, evaluation criteria for these instruments and examples of environmental instruments like taxes or certificates will be discussed. The final part deals with implementation strategies of material and energy policy.

**Learning Content**

The course deals with material and energy policy of policy makers and includes the effects of such policies on the economy as well as the involvement of industrial and other stakeholders in the policy design. At the beginning the neoclassical environment policy is discussed. Afterwards the Sustainable Development concept is presented and strategies how to translate the concept in policy decision follows. In the next part of the course an overview about the different environmental instruments classes, evaluation criteria for these instruments and examples of environmental instruments like taxes or certificates will be discussed. The final part deals with implementation strategies of material and energy policy.

**Workload**

The total workload for this course is approximately 105.0 hours. For further information see German version.

**Literature**

Will be announced in the lecture.
7.69 Course: Engine Measurement Techniques [T-MACH-105169]

**Responsible:** Dr.-Ing. Sören Bernhardt  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

**Type**  
Oral examination

**Credits**  
4

**Recurrence**  
Each summer term

**Version**  
1

### Events

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<td>SS 2019</td>
<td>Engine measurement techniques</td>
<td>4</td>
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**Competence Certificate**  
oral examination, Duration: 0,5 hours, no auxiliary means

**Prerequisites**  
none

**Recommendation**  
T-MACH-102194 Combustion Engines I

Below you will find excerpts from events related to this course:

**Learning Content**  
Students get to know state-of-the-art measurement techniques for combustion engines. In particular basic techniques for measuring engine operating parameters such as torque, speed, power and temperature.

Possible measurement errors and aberrations are discussed.

Furthermore techniques for measuring exhaust emissions, air/fuel ratio, fuel consumption as well as pressure indication for thermodynamic analysis are covered.

**Workload**  
regular attendance: 21 hours  
self-study: 100 hours

**Literature**

1. Grohe, H.: Messen an Verbrennungsmotoren  
2. Bosch: Handbuch Kraftfahrzeugtechnik  
3. Veröffentlichungen von Firmen aus der Meßtechnik  
4. Hoffmann, Handbuch der Meßtechnik  
5. Klingenberg, Automobil-Meßtechnik, Band C
7.70 Course: Exam on Climatology [T-PHYS-105594]

**Responsible:** Prof. Dr. Joaquim José Ginete Werner Pinto

**Organisation:** KIT Department of Physics

**Part of:**
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<td>Each summer term</td>
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</table>
7.71 Course: Facility Location and Strategic Supply Chain Management [T-WIWI-102704]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101413 - Applications of Operations Research
M-WIWI-101414 - Methodical Foundations of OR
M-WIWI-101421 - Supply Chain Management

Type: Written examination
Credits: 4.5
Recurrence: Each winter term
Version: 4

Competence Certificate
Due to a research semester of Professor Nickel in WS 19/20, the course "Facility Location and Strategic Supply Chain Management" does NOT take place in WS 19/20. In particular, neither WS 19/20 nor SS 20 will offer an exam for the lecture. The follow-up exam to the lecture in WS 18/19 takes place in SS 19 and is exclusively for students in the second examination. The assessment consists of a written exam (60 min) according to Section 4 (2), 1 of the examination regulation.

The exam takes place in every semester.
Prerequisite for admission to examination is the successful completion of the online assessments.

Prerequisites
Prerequisite for admission to examination is the successful completion of the online assessments.

Recommendation
None

Annotation
The lecture is held in every winter term. The planned lectures and courses for the next three years are announced online.
7.72 Course: Failure of Structural Materials: Deformation and Fracture [T-MACH-102140]

**Responsible:** Prof. Dr. Peter Gumbsch  
Dr. Daniel Weygand  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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<td>WS 19/20</td>
<td>2181711</td>
<td>Failure of structural materials: deformation and fracture</td>
<td>3</td>
<td>Lecture / Practice (VÜ)</td>
<td>Gumbsch, Weygand</td>
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</table>

**Competence Certificate**
oral exam ca. 30 minutes  
no tools or reference materials

**Prerequisites**
none

**Recommendation**
preliminary knowledge in mathematics, mechanics and materials science

*Below you will find excerpts from events related to this course:*

**Learning Content**

1. Introduction  
2. linear elasticity  
3. classification of stresses  
4. Failure due to plasticity  
   - tensile test  
   - dislocations  
   - hardening mechanisms  
   - guidelines for dimensioning
5. composite materials  
6. fracture mechanics  
   - hypotheses for failure  
   - linear elastic fracture mechanics  
   - crack resistance  
   - experimental measurement of fracture toughness  
   - defect measurement  
   - crack propagation  
   - application of fracture mechanics  
   - atomistics of fracture

**Workload**
regular attendance: 22.5 hours  
self-study: 97.5 hours
Literature

- Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relatively simple but yet comprehensive overview of metallic materials
7.73 Course: Failure of Structural Materials: Fatigue and Creep [T-MACH-102139]

**Responsibility:** Dr. Patric Gruber
Prof. Dr. Peter Gumbsch

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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**Competence Certificate**
oral exam ca. 30 minutes
no tools or reference materials

**Prerequisites**
none

**Recommendation**
preliminary knowledge in mathematics, mechanics and materials science

*Below you will find excerpts from events related to this course:*

**Learning Content**
1 Fatigue
1.1 Introduction
1.2 Statistical Aspects
1.3 Lifetime
1.4 Fatigue Mechanisms
1.5 Material Selection
1.6 Thermomechanical Loading
1.7 Notches and Shape Optimization
1.8 Case Study: ICE-Desaster

2 Creep
2.1 Introduction
2.2 High Temperature Plasticity
2.3 Phänomenological Description of Creep
2.4 Creep Mechanisms
2.5 Alloying Effects

**Workload**
regular attendance: 22.5 hours
self-study: 97.5 hours
Literature

- Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relatively simple but yet comprehensive overview of metallic materials
- Fatigue of Materials, Subra Suresh (2nd Edition, Cambridge University Press); standard work on fatigue, all classes of materials, extensive, for beginners and advanced student
### Course: Financial Accounting and Cost Accounting [T-WIWI-102816]

**Responsible:** Dr. Jan-Oliver Strych

**Organisation:**
- KIT Department of Informatics
- KIT Department of Economics and Management

**Part of:** M-WIWI-101578 - Fundamentals of Business Administration 2

**Type:** Written examination

**Credits:** 4

**Recurrence:** Each winter term

**Version:** 1

**Events**

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**Competence Certificate**

The assessment consists of a written exam following §4, Abs. 2, 1 of the examination regulation. The examination takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

Below you will find excerpts from events related to this course:

- **V** 2600002, WS 19/20, 2 SWS,
  - Open in study portal
  - Lecture (V)

**Learning Content**

1. Introduction to accounting standards (IFRS, HGB)
2. Annual report and financial statements
3. Selected topics in financial accounting
4. Operational efficiency analysis
5. Financial Statement Analysis
6. Value-based management
7. Taxes
8. Creative accounting and compliance
9. Budgeting and benchmarking
10. Reporting

**Annotation**

It is recommended to have some skills about financial accounting on an introductory level.

**Workload**

The total workload for this course is approximately 120 hours. For further information see the German version.
7.75 Course: Financial Accounting for Global Firms [T-WIWI-107505]

Responsible: Dr. Torsten Luedecke
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101423 - Topics in Finance II
M-WIWI-101465 - Topics in Finance I

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</table>

Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Prerequisites
None

Recommendation
Basic knowledge in corporate finance and accounting.

Annotation
New lecture in the winter term 2017/18.

Below you will find excerpts from events related to this course:

V Financial Accounting for Global Firms
2530242, WS 19/20, 2 SWS, Language: Englisch, Open in study portal

Description
Increasing globalization coupled with related regulations continues to put pressure on moving towards a common global accounting framework - International Financial Reporting Standards (IFRS). Currently, more than 100 countries use IFRS, so if a firm's business include global transactions, it is critical to know about the impact of IFRS on the financial reporting process and business. In the EU, IFRS are compulsory for listed companies's consolidated statements but have also gained factual significance for companies without statutory duty to use IFRS. The course introduces the conceptual framework of IFRS, discuss the primary financial statements according to IFRS and explains the underlying principles, concepts, and methods to prepare the financial statements. Special focus is given to some more complex accounting issues related to revenue recognition from contracts with customers, consolidation of different types of intercorporate investments, and foreign currency translation.

Learning Content
The lecture covers the following topics:

- The context of financial accounting for global firms
- The mechanics of financial accounting
- Accounting frameworks and concepts
- Content and presentation of financial statements
- Preparing financial statements
- Revenue recognition from contracts
- Tangible and intangible non-current assets
- Financial assets, liabilities, and equity
- Consolidation and the assessment of control
- Investment in associates and joint arrangements
- Business combinations
- Foreign currency translation
**Literature**
7.76 Course: Financial Econometrics [T-WIWI-103064]

**Responsible:** Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101599 - Statistics and Econometrics

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**Competence Certificate**
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**
None

**Recommendation**
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics"[2520016]

**Annotation**
The course takes place each second summer term: 2018/2020....
### Course: Financial Intermediation [T-WIWI-102623]

**Responsible:** Prof. Dr. Martin Ruckes  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101423 - Topics in Finance II  
M-WIWI-101465 - Topics in Finance I

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<td>Ruckes</td>
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<td>2530233</td>
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<td>Practice (Ü)</td>
<td>Ruckes, Hoang, Benz</td>
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</table>

**Competence Certificate**

The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

**Prerequisites**

None

**Recommendation**

None

---

**Below you will find excerpts from events related to this course:**

#### Financial Intermediation

**2530232, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal](#)**

**Lecture (V)**

**Description**

- Arguments for the existence of financial intermediaries
- Bank loan analysis, relationship lending
- Competition in the banking sector
- Stability of the financial system
- The macroeconomic role of financial intermediation

**Learning Content**

- Arguments for the existence of financial intermediaries
- Bank loan analysis, relationship lending
- Stability of the financial system
- The macroeconomic role of financial intermediation
- Principles of the prudential regulation of banks

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

**Elective literature:**

7.78 Course: Financial Management [T-WIWI-102605]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101435 - Essentials of Finance

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</table>

Competence Certificate
The assessment consists of a written exam (60 min.) according to Section 4 (2), 1 of the examination regulation. The exam takes place at every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
Knowledge of the content of the course Business Administration: Finance and Accounting [25026/25027] is recommended.

Below you will find excerpts from events related to this course:

V Financial Management
2530216, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Description
Analytical methods and theories in the field 'Capital investments and financing' with the main focus on:

- Capital Structure
- Dividend policy
- Essentials of valuation
- Investment decisions
- Short term/long term finance
- Working Capital Management

Learning Content
Analytical methods and theories in the field of corporate finance with the main focus on:

- Liquidity and Working Capital Management
- Sources of short term/long term finance
- Capital Structure
- Dividend policy

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
Elective literature:

Course: Fluid Power Systems [T-MACH-102093]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer
Felix Pult

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101266 - Automotive Engineering
M-MACH-101267 - Mobile Machines

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<td>2 SWS</td>
<td>Lecture (V)</td>
<td>Geimer, Pult</td>
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</table>

**Competence Certificate**
The assessment consists of a written exam (90 minutes) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Fluid Technology**
2114093, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**
In the range of hydrostatics the following topics will be introduced:

- Hydraulic fluids
- Pumps and motors
- Valves
- Accessories
- Hydraulic circuits.

In the range of pneumatics the following topics will be introduced:

- Compressors
- Motors
- Valves
- Pneumatic circuits.

**Workload**
- regular attendance: 21 hours
- self-study: 92 hours

**Literature**
Scritum for the lecture *Fluidtechnik*
Institute of Vehicle System Technology
downloadable
7.80 Course: Foundations of Informatics I [T-WIWI-102749]

Responsible: Prof. Dr. York Sure-Vetter  
Organisation: KIT Department of Economics and Management  
Part of: M-WIWI-101417 - Foundations of Informatics

Type: Written examination  
Credits: 5  
Recurrence: Each summer term  
Version: 1

Events

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<td>2511011</td>
<td>Exercises to Foundations of Informatics I</td>
<td>SWS</td>
<td>Practice (Ü)</td>
<td>Sure-Vetter, Nguyen, Weller</td>
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Competence Certificate
The assessment consists of an 1h written exam according to Section 4 (2), 1 of the examination regulation. The exam takes place every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Foundations of Informatics I  
2511010, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal]

Description
The lecture provides an introduction to basic concepts of computer science and software engineering. Essential theoretical foundations and problem-solving approaches, which are relevant in all areas of computer science, are presented and explained, as well as shown in practical implementations.

Learning Content
The following topics are covered:
- Object Oriented Modeling
- Logic (Propositional Calculus, Predicate Logic, Boolean Algebra)
- Algorithms and Their Properties
- Sort-and Search-Algorithms
- Complexity Theory
- Problem Specification
- Dynamic Data Structures

Workload
- The total workload for this course is approximately 150 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 67.5 hours
- Exam and exam preparation: 37.5 hours

Literature

Additional literature will be announced in the lecture.
Exercises to Foundations of Informatics I
2511011, SS 2019, SWS, Language: Deutsch, Open in study portal

Description
Multiple exercises are held that capture the topics, held in the lecture Foundations of Informatics I, and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

Learning Content
The following topics are covered:

- Object Oriented Modeling
- Logic (Propositional Calculus, Predicate Logic, Boolean Algebra)
- Algorithms and Their Properties
- Sort-and Search-Algorithms
- Complexity Theory
- Problem Specification
- Dynamic Data Structures

Workload
The total workload for the lecture Foundations of Informatics I is given out on the description of the lecture.

Literature


Additional literature will be announced in the lecture.
7.81 Course: Foundations of Informatics II [T-WIWI-102707]

**Responsible:** Dr. rer. nat. Achim Rettinger  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101417 - Foundations of Informatics

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**Events**

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**Competence Certificate**
The assessment consists of a written exam (90 min.) according to Section 4(2), 1 of the examination regulation. The grade of the exam can be improved by successfully participating in the tutorials. The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Recommendation**
It is recommended to attend the course *Foundations of Informatics I* [2511010] beforehand. Active participation in the practical lessons is strongly recommended.

Below you will find excerpts from events related to this course:

**Learning Content**
The lecture deals with formal models for automata, languages and algorithms as well as real instances of these models, i.e. computer architecture and organization (hardware development, computer arithmetic, architecture models), programming languages (different language levels, from microprogramming to higher programming languages, as well as compiling and execution), operating systems and modes (architecture and properties of operating systems, operating system tasks, client-server systems), data organization and management (types of data organization, primary and secondary organization).

**Workload**
The total workload for this course is approximately 150 hours. For further information see German version.

**Literature**
Elective literature:
Will be announced in the lecture.
7.82 Course: Foundations of Interactive Systems [T-WIWI-109816]

**Responsible:** Prof. Dr. Alexander Mädche

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101434 - eBusiness and Service Management
- M-WIWI-102752 - Fundamentals of Digital Service Systems
- M-WIWI-104913 - Information Systems & Digital Business: Servitization

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<td>Foundations of Interactive Systems</td>
<td>3 SWS</td>
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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
New course starting summer term 2019.

*Below you will find excerpts from events related to this course:*

**V**

**Foundations of Interactive Systems**
2540560, SS 2019, 3 SWS, Language: Englisch, [Open in study portal](#)

**Description**
Advanced information and communication technologies make interactive systems ever-present in the users’ private and business life. They are an integral part of smartphones, devices in the smart home, mobility vehicles as well as at the working place.

With the continuous growing capabilities of computers, the design of the interaction between human and computer becomes even more important. This lecture introduces foundations on design processes and principles for interactive systems.

The lecture focuses on foundational concepts, theories, practices and methods for the design of interactive systems. The students get the foundational knowledge to guide the design of interactive systems in business and private life.
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### Competence Certificate
The assessment of this course is a written (60 min.) or (if necessary) oral examination according to §4(2) of the examination regulation.

### Prerequisites
None

### Annotation
Lecture and exercises are integrated.
7.84 Course: Fuels and Lubricants for Combustion Engines [T-MACH-105184]

**Responsible:** Dr.-Ing. Bernhard Ulrich Kehrwald  
Dr.-Ing. Heiko Kubach  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101303 - Combustion Engines II

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</table>

**Competence Certificate**  
oral examination, Duration: ca. 25 min., no auxiliary means

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

**Fundamentals and basics**  
Fuels for Gasoline and Diesel engines  
Hydrogen  
Lubricants for Gasoline and Diesel engines  
Coolants for combustion engines

**Learning Content**  
Introduction and basics  
Fuels for Gasoline and Diesel engines  
Hydrogen  
Lubricants for Gasoline and Diesel engines  
Coolants for combustion engines

**Workload**  
regular attendance: 24 hours  
self-study: 96 hours

**Literature**  
Lecturer notes
7.85 Course: Fundamentals for Design of Motor-Vehicle Bodies I [T-MACH-102116]

**Responsible:** Horst Dietmar Bardehle  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101266 - Automotive Engineering

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<td>2113814</td>
<td>Fundamentals for Design of Motor-Vehicles Bodies I</td>
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**Competence Certificate**

Oral group examination  
Duration: 30 minutes  
Auxiliary means: none  
Prerequisites: none

*Below you will find excerpts from events related to this course:*

**Fundamentals for Design of Motor-Vehicles Bodies I**

2113814, WS 19/20, 1 SWS, Language: Deutsch, [Open in study portal](#)

**Notes**

Anticipated dates: 23 October 2019, 30 October 2019, 6 November 2019, 20 November 2019, 27 November 2019 (alternate date), and 4 December 2019 (alternate date).  
Further information will be published on the homepage of the institute

**Learning Content**

1. History and design  
2. Aerodynamics  
3. Design methods (CAD/CAM, FEM)  
4. Manufacturing methods of body parts  
5. Fastening technologies  
6. Body in white / body production, body surface

**Workload**

Regular attendance: 10.5 hours  
Self-study: 49.5 hours

**Literature**

1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden  
2. Automobil Revue, Bern (Schweiz)  
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg
7.86 Course: Fundamentals for Design of Motor-Vehicle Bodies II [T-MACH-102119]

**Responsible:** Horst Dietmar Bardehle  
**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101266 - Automotive Engineering

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**Competence Certificate**  
Oral group examination  
Duration: 30 minutes  
Auxiliary means: none

**Prerequisites**  
none

**Below you will find excerpts from events related to this course:**

**Fundamentals for Design of Motor-Vehicles Bodies II**  
2114840, SS 2019, 1 SWS, Language: Deutsch

**Notes**  
Scheduled dates: see homepage of the institute.  
Further information and possible changes of date: see homepage of the institute.

**Learning Content**  
1. Body properties/testing procedures  
2. External body-parts  
3. Interior trim  
4. Compartment air conditioning  
5. Electric and electronic features  
6. Crash tests  
7. Project management aspects, future prospects

**Workload**  
regular attendance: 10.5 hours  
self-study: 49.5 hours

**Literature**  
1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden  
2. Automobil Revue, Bern (Schweiz)  
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg
7.87 Course: Fundamentals in the Development of Commercial Vehicles I [T-MACH-105160]

- **Responsible:** Prof. Dr. Jörg Zürn
- **OrGANisation:** KIT Department of Mechanical Engineering
- **Part of:** M-MACH-101265 - Vehicle Development
  M-MACH-101267 - Mobile Machines

### Type
- Oral examination

### Credits
- 1.5

### Recurrence
- Each winter term

### Version
- 1

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**Competence Certificate**
- Oral group examination

**Duration:** 30 minutes

**Auxiliary means:** none

**Prerequisites**
- none

*Below you will find excerpts from events related to this course:*

**Fundamentals in the Development of Commercial Vehicles I**
- 2113812, WS 19/20, 1 SWS, Language: Deutsch, [Open in study portal]

**Notes**
- Further information will be published on the homepage of the institute.

**Learning Content**
1. Introduction, definitions, history
2. Development tools
3. Complete vehicle
4. Cab, bodyshell work
5. Cab, interior fitting
6. Alternative drive systems
7. Drive train
8. Drive system diesel engine
9. Intercooled diesel engines

**Workload**
- regular attendance: 10.5 hours
- self-study: 49.5 hours

**Literature**
### 7.88 Course: Fundamentals in the Development of Commercial Vehicles II [T-MACH-105161]

**Responsible:** Prof. Dr. Jörg Zürn  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101265 - Vehicle Development  
M-MACH-101267 - Mobile Machines

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<th>1 SWS</th>
<th>Lecture (V)</th>
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**Competence Certificate**

- **Oral group examination**

**Duration:** 30 minutes

**Auxiliary means:** none

**Prerequisites**

- none

*Below you will find excerpts from events related to this course:*

### Fundamentals in the Development of Commercial Vehicles II

**2114844, SS 2019, 1 SWS, Language: Deutsch, Open in study portal**

**Lecture (V)**

**Learning Content**

1. Gear boxes of commercial vehicles
2. Intermediate elements of the drive train
3. Axle systems
4. Front axles and driving dynamics
5. Chassis and axle suspension
6. Braking System
7. Systems
8. Excursion

**Workload**

- regular attendance: 10,5 hours  
- self-study: 49,5 hours

**Literature**

7.89 Course: Fundamentals of Automobile Development I [T-MACH-105162]

**Responsible:** Dipl.-Ing. Rolf Frech  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101265 - Vehicle Development

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**Competence Certificate**

Written examination  
**Duration:** 90 minutes  
**Auxiliary means:** none  
**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Fundamentals of Automobile Development I**

2113810, WS 19/20, 1 SWS, Language: Deutsch, Open in study portal  
Lecture (V)

**Notes**

Block lecture in room 219 in building 70.04 (Campus East).  
Date: 21 October 2019, 28 October 2019 and 4 November 2019 from 8:00 to 11:00 a.m.  
Further information will be published on the homepage of the institute.

**Learning Content**

1. Process of automobile development  
2. Conceptual dimensioning and design of an automobile  
3. Laws and regulations – National and international boundary conditions  
4. Aero dynamical dimensioning and design of an automobile I  
5. Aero dynamical dimensioning and design of an automobile II  
6. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines I  
7. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines II

**Workload**

regular attendance: 10.5 hours  
self-study: 49.5 hours

**Literature**

The scriptum will be provided during the first lessons

**Principles of Whole Vehicle Engineering I**

2113851, WS 19/20, 1 SWS, Language: Englisch, Open in study portal  
Lecture (V)
Notes
Block lecture in room 219 in building 70.04 (Campus East), in English.
Date: 21 October 2019, 28 October 2019 and 4 November 2019 from 11:00 a.m. to 2:00 p.m.
Further information will be published on the homepage of the institute.

Learning Content
1. Process of automobile development
2. Conceptual dimensioning and design of an automobile
3. Laws and regulations – National and international boundary conditions
4. Aero dynamical dimensioning and design of an automobile
5. Aero dynamical dimensioning and design of an automobile
6. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines
7. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines

Workload
regular attendance: 10,5 hours
self-study: 49,5 hours

Literature
The scriptum will be provided during the first lessons
### 7.90 Course: Fundamentals of Automobile Development II [T-MACH-105163]

**Responsible:** Dipl.-Ing. Rolf Frech  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101265 - Vehicle Development

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**Competence Certificate**

- **Written examination**
  - **Duration:** 90 minutes
  - **Auxiliary means:** none
  - **Prerequisites:** none

Below you will find excerpts from events related to this course:

#### Fundamentals of Automobile Development II

- **2114842, SS 2019, 1 SWS, Language: Deutsch,** Open in study portal

**Learning Content**

1. Application-oriented material and production technology I  
2. Application-oriented material and production technology II  
3. Overall vehicle acoustics in the automobile development  
4. Drive train acoustics in the automobile development  
5. Testing of the complete vehicle  
6. Properties of the complete automobile

**Workload**

- Regular attendance: 10.5 hours  
- Self-study: 49.5 hours

**Literature**

The scriptum will be provided during the first lessons.

#### Principles of Whole Vehicle Engineering II

- **2114860, SS 2019, 1 SWS, Language: Englisch,** Open in study portal

**Notes**

In English language.
Learning Content
1. Application-oriented material and production technology I
2. Application-oriented material and production technology II
3. Overall vehicle acoustics in the automobile development
4. Drive train acoustics in the automobile development
5. Testing of the complete vehicle
6. Properties of the complete automobile

Workload
regular attendance: 10,5 hours
self-study: 49,5 hours

Literature
The scriptum will be provided during the first lessons.
7.91 Course: Fundamentals of Catalytic Exhaust Gas Aftertreatment [T-MACH-105044]

**Responsible:** Prof. Dr. Olaf Deutschmann  
Prof. Dr. Jan-Dierk Grunwaldt  
Dr.-Ing. Heiko Kubach  
Prof. Dr.-Ing. Egbert Lox

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

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<td>Lox, Grunwaldt</td>
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**Competence Certificate**  
oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

**Fundamentals of catalytic exhaust gas aftertreatment**  
2134138, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal]

**Learning Content**
1. kind and source of emissions  
2. emission legislation  
3. principal of catalytic exhaust gas aftertreatment (EGA)  
4. EGA at stoichiometric gasoline engines  
5. EGA at gasoline engines with lean mixtures  
6. EGA at diesel engines  
7. economical basic conditions for catalytic EGA

**Workload**  
regular attendance: 36 hours  
self-study: 84 hours

**Literature**
Lecture notes available in the lectures

7 COURSES

Course: Fundamentals of Production Management [T-WIWI-102606]

7.92 Course: Fundamentals of Production Management [T-WIWI-102606]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101437 - Industrial Production I

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Events

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<td>2 SWS</td>
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Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Below you will find excerpts from events related to this course:

Fundamentals of Production Management
2581950, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Description
This lecture focuses on strategic production management with respect to various economic aspects. Interdisciplinary approaches of systems theory will be used to describe the challenges of industrial production. This course will emphasize the importance of R&D as the central step in strategic corporate planning to ensure future long-term success.
In the field of site selection and planning for firms and factories, attention will be drawn upon individual aspects of existing and greenfield sites as well as existing distribution and supply centres. Students will obtain knowledge in solving internal and external transport and storage problems with respect to supply chain management and disposal logistics.
Medien und Pflichtliteratur: können aus der alten Fassung übernommen werden.

Learning Content
This lecture focuses on strategic production management with respect to various economic aspects. Interdisciplinary approaches of systems theory will be used to describe the challenges of industrial production. This course will emphasize the importance of R&D as the central step in strategic corporate planning to ensure future long-term success.
In the field of site selection and planning for firms and factories, attention will be drawn upon individual aspects of existing and greenfield sites as well as existing distribution and supply centres. Students will obtain knowledge in solving internal and external transport and storage problems with respect to supply chain management and disposal logistics.

Workload
Total effort required will account for approximately 165h (5.5 credits).

Literature
will be announced in the course
### 7.93 Course: Gas Engines [T-MACH-102197]

**Responsible:** Dr.-Ing. Rainer Golloch  
Dr.-Ing. Heiko Kubach  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101303 - Combustion Engines II

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<tr>
<td>Oral examination</td>
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<td>Each summer term</td>
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</table>

**Competence Certificate**  
Oral examination, duration 25 min., no auxillary means

**Prerequisites**  
none
7.94 Course: Gear Cutting Technology [T-MACH-102148]

Responsible: Dr. Markus Klaiber
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101284 - Specialization in Production Engineering

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Events

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<td>2149655</td>
<td>2 SWS Lecture (V)</td>
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Competence Certificate
Oral Exam (20 min)

Prerequisites
none

Below you will find excerpts from events related to this course:

Description
Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)

Notes
Based on the gearing theory, manufacturing processes and machine technologies for producing gearings, the needs of modern gear manufacturing will be discussed in the lecture. For this purpose, various processes for various gear types are taught which represent the state of the art in practice today. A classification in soft and hard machining and furthermore in cutting and non-cutting technologies will be made. For comprehensive understanding the processes, machine technologies, tools and applications of the manufacturing of gearings will be introduced and the current developments presented. For assessment and classification of the applications and the performance of the technologies, the methods of mass production and manufacturing defects will be discussed. Sample parts, reports from current developments in the field of research and an excursion to a gear manufacturing company round out the lecture.

Learning Outcomes:
The students...

- can describe the basic terms of gearings and are able to explain the imparted basics of the gearwheel and gearing theory.
- are able to specify the different manufacturing processes and machine technologies for producing gearings. Furthermore they are able to explain the functional principles and the dis-/advantages of these manufacturing processes.
- can apply the basics of the gearing theory and manufacturing processes on new problems.
- are able to read and interpret measuring records for gearings. are able to make an appropriate selection of a process based on a given application
- can describe the entire process chain for the production of toothed components and their respective influence on the resulting workpiece properties.

Workload:
regular attendance: 21 hours
self-study: 99 hours
Learning Content
Based on the gearing theory, manufacturing processes and machine technologies for producing gearings, the needs of modern gear manufacturing will be discussed in the lecture. For this purpose, various processes for various gear types are taught which represent the state of the art in practice today. A classification in soft and hard machining and furthermore in cutting and non-cutting technologies will be made. For comprehensive understanding the processes, machine technologies, tools and applications of the manufacturing of gearings will be introduced and the current developments presented. For assessment and classification of the applications and the performance of the technologies, the methods of mass production and manufacturing defects will be discussed. Sample parts, reports from current developments in the field of research and an excursion to a gear manufacturing company round out the lecture.

Workload
regular attendance: 21 hours
self-study: 99 hours
7.95 Course: Geological Hazards and Risk [T-PHYS-103525]

**Responsible:** Dr. Ellen Gottschämmmer

**Organisation:** KIT Department of Physics

**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

**Type**
- Examination of another type

**Credits**
- 8

**Recurrence**
- Each winter term

**Version**
- 2

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<td>4060122</td>
<td>Exercises on Geological Hazards and Risk</td>
<td>2</td>
<td>Practice (Ü)</td>
<td>Gottschämmmer, Daniell</td>
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</table>
7.96 Course: Global Optimization I [T-WIWI-102726]

**Responsible:** Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101413 - Applications of Operations Research
- M-WIWI-101414 - Methodical Foundations of OR

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</table>

**Competence Certificate**

Success is in the form of a written examination (60 min.) (according to § 4(2), 1 SPO) and possibly of a compulsory prerequisite. The exam is offered in the lecture of semester and the following semester. The success check can be done also with the success control for “Global optimization II”. In this case, the duration of the written exam is 120 min.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
Part I and II of the lecture are held consecutively in the same semester.

*Below you will find excerpts from events related to this course:*

**Globale Optimierung I**

2550134, SS 2019, 2 SWS, Open in study portal

**Lecture (V)**

**Learning Content**

In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

Part I of the lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Numerical methods

Nonconvex optimization problems are treated in part II of the lecture.

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.
Literature

- W. Alt Numerische Verfahren der konvexen, nichtglatten Optimierung Teubner 2004
- C.A. Floudas Deterministic Global Optimization Kluwer 2000
- R. Horst, H. Tuy Global Optimization Springer 1996
7.97 Course: Global Optimization I and II [T-WIWI-103638]

**Responsible:** Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101414 - Methodical Foundations of OR

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**Events**

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</table>

**Competence Certificate**
The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

The examination is held in the semester of the lecture and in the following semester.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

**V Globale Optimierung I**

2550134, SS 2019, 2 SWS, [Open in study portal](#)

Lecture (V)

**Learning Content**
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

Part I of the lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Numerical methods

Nonconvex optimization problems are treated in part II of the lecture.

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

**Literature**
- W. Alt Numerische Verfahren der konvexen, nichtglatten Optimierung Teubner 2004
- C.A. Floudas Deterministic Global Optimization Kluwer 2000
- R. Horst, H. Tuy Global Optimization Springer 1996
Learning Content
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The global solution of convex optimization problems is subject of part I of the lecture.

Part II of the lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via aBB method
- Branch and bound methods
- Lipschitz optimization

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature

- W. Alt Numerische Verfahren der konvexen, nichtglatten Optimierung Teubner 2004
- C.A. Floudas Deterministic Global Optimization Kluwer 2000
- R. Horst, H. Tuy Global Optimization Springer 1996
### Course: Global Optimization II [T-WIWI-102727]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101414 - Methodical Foundations of OR

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#### Events

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<td>Globale Optimierung II</td>
<td>2</td>
<td>Lecture (V)</td>
<td>Stein</td>
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#### Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation and possibly of a compulsory prerequisite. The examination is held in the semester of the lecture and in the following semester. The examination can also be combined with the examination of “Global optimization I”. In this case, the duration of the written examination takes 120 minutes.

#### Prerequisites

None

#### Annotation

Part I and II of the lecture are held consecutively in the same semester.

*Below you will find excerpts from events related to this course:*

### Lecture (V)

**Globale Optimierung II**  
2550136, SS 2019, 2 SWS, [Open in study portal](#)

**Learning Content**

In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The global solution of convex optimization problems is subject of part I of the lecture. Part II of the lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via aBB method
- Branch and bound methods
- Lipschitz optimization

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

**Literature**

- W. Alt Numerische Verfahren der konvexen, nichtglatten Optimierung Teubner 2004
- C.A. Floudas Deterministic Global Optimization Kluwer 2000
- R. Horst, H. Tuy Global Optimization Springer 1996
7.99 Course: Handling Characteristics of Motor Vehicles I [T-MACH-105152]

**Responsible:** Dr.-Ing. Hans-Joachim Unrau
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

### Type, Credits, Recurrence, Version

- **Type:** Oral examination
- **Credits:** 3
- **Recurrence:** Each winter term
- **Version:** 1

### Events

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<td>Handling Characteristics of Motor Vehicles I</td>
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<td>Lecture (V)</td>
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</table>

**Competence Certificate**
Verbally

**Duration:** 30 up to 40 minutes

**Auxiliary means:** none

**Prerequisites**
none

---

*Below you will find excerpts from events related to this course:*

### Learning Content

1. **Problem definition:** Control loop driver - vehicle - environment (e.g. coordinate systems, modes of motion of the car body and the wheels)

2. **Simulation models:** Creation from motion equations (method according to D'Alembert, method according to Lagrange, programme packages for automatically producing of simulation equations), model for handling characteristics (task, motion equations)

3. **Tyre behavior:** Basics, dry, wet and winter-smooth roadway

### Workload

- **regular attendance:** 22.5 hours
- **self-study:** 97.5 hours

### Literature


7.100 Course: Handling Characteristics of Motor Vehicles II [T-MACH-105153]

Responsible: Dr.-Ing. Hans-Joachim Unrau
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101264 - Handling Characteristics of Motor Vehicles

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<td>SS 2019 2114838</td>
<td>Oral examination</td>
<td>3</td>
<td>Each summer term</td>
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Competence Certificate
Oral Examination

Duration: 30 up to 40 minutes

Auxiliary means: none

Prerequisites
none

Below you will find excerpts from events related to this course:

Handling Characteristics of Motor Vehicles II
2114838, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Learning Content
1. Vehicle handling: Bases, steady state cornering, steering input step, single sine, double track switching, slalom, cross-wind behavior, uneven roadway

2. stability behavior: Basics, stability conditions for single vehicles and for vehicles with trailer

Workload
regular attendance: 22.5 hours
self-study: 97.5 hours

Literature

Responsible: Dr. Günter Schell
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101262 - Emphasis Materials Science

Type: Oral examination
Credits: 4
Recurrence: Each summer term
Version: 1

| Events | SS 2019 | 2126749 | Advanced powder metals | 2 SWS | Lecture (V) | Schell |

Competence Certificate
oral exam, 20-30 min

Prerequisites
none

Below you will find excerpts from events related to this course:

Advanced powder metals
2126749, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Learning Content
The lecture gives an overview on production, properties and application of structural and functional powder metallurgy materials. The following groups of materials are presented: PM High Speed Steels, Cemented Carbides, PM Metal Matrix Composites, PM Specialities, PM Soft Magnetic and Hard Magnetic Materials.

Workload
regular attendance: 22 hours
self-study: 98 hours

Literature
- R.M. German. "Powder metallurgy and particulate materials processing. Metal Powder Industries Federation, 2005
7.102 Course: Human Resource Management [T-WIWI-102909]

**Responsible:** Prof. Dr. Petra Nieken

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101513 - Human Resources and Organizations

**Type**
Written examination

**Credits**
4,5

**Recurrence**
Each winter term

**Version**
1

**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. In case of a small number of registrations, we might offer an oral exam instead of a written exam.

**Prerequisites**
None

**Recommendation**
Completion of module Business Administration is recommended. Basic knowledge of microeconomics, game theory, and statistics is recommended.
### 7.103 Course: Hydraulic Engineering and Water Management [T-BGU-101667]

**Responsible:** Prof. Dr. Franz Nestmann

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Events**

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<td>Wasserbau und Wasserwirtschaft [bauIFP4-WASSER]</td>
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**Competence Certificate**
written exam with 60 minutes

**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
Course: Hydrology [T-BGU-101693]

Responsible: Prof. Dr.-Ing. Erwin Zehe
Organisation: KIT Department of Civil Engineering, Geo- and Environmental Sciences
Part of: M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

Type: Written examination
Credits: 4
Recurrence: Each winter term
Version: 2

Events

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<td>Übungen zu Hydrologie [bauiBFP4-WASSER]</td>
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<td>Practice (Ü)</td>
<td>Zehe, Wienhöfer</td>
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Prerequisites
None

Recommendation
None

Annotation
None
T 7.105 Course: I4.0 Systems platform [T-MACH-106457]

**Responsible:** Dipl.-Ing. Thomas Maier  
Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Events**

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<td>I4.0 Systems platform</td>
<td>4 SWS</td>
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<td>4 SWS</td>
<td>Ovtcharova, Maier</td>
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**Competence Certificate**

Alternative exam assessment (project work)

**Prerequisites**

None

**Annotation**

Limited number of participants.

Below you will find excerpts from events related to this course:

**I4.0 Systems platform**

2123900, SS 2019, 4 SWS, Language: Deutsch, [Open in study portal](#)

**Notes**

Number of participants limited to 15 people. There is a participant selection process.

**Learning Content**

Industry 4.0, IT systems for fabrication (e.g.: CAx, PDM, CAM, ERP, MES), process modelling and execution, project work in teams, practice-relevant I4.0 problems, in automation, manufacturing industry and service.
### 7.106 Course: Industrial Organization [T-WIWI-102844]

**Responsible:** Prof. Dr. Johannes Philipp Reiß  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101499 - Applied Microeconomics  
M-WIWI-101501 - Economic Theory

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<td>2 SWS</td>
<td>Lecture (V)</td>
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<td>SS 2019</td>
<td>2560239</td>
<td>Übung zu Industrieökonomie</td>
<td>2 SWS</td>
<td>Practice (Ü)</td>
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**Competence Certificate**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Recommendation**
Completion of the module Economics [WW1VWL] is assumed.

**Annotation**
This course is not given in summer 2017.

*Below you will find excerpts from events related to this course:

**Industrial Organization**  
2560238, SS 2019, 2 SWS, Language: Deutsch, Open in study portal  
Lecture (V)

**Learning Content**
This course introduces the theory of industrial organization using game theoretical models. The course is divided into two parts: The first part reviews standard market forms (monopoly, oligopoly, perfect competition). The second part discusses more advanced topics including price discrimination, strategic product differentiation, cartel formation, market entry, and research and development.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**
**Compulsory Textbook:**

**Additional Literature:**
7.107 Course: Information Engineering [T-MACH-102209]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Events**

<table>
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<th>Course Name</th>
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<tr>
<td>SS 2019</td>
<td>2122014</td>
<td>Information Engineering</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
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</tbody>
</table>

**Competence Certificate**

Alternative exam assessment (written composition and speech)

**Prerequisites**

None
7.108 Course: Integrated Information Systems for Engineers [T-MACH-102083]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101270 - Product Lifecycle Management

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<td>Oral exam</td>
<td>4</td>
<td>Each summer term</td>
<td>2</td>
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**Events**

| SS 2019 | 2121001 | Integrated Information Systems for engineers | 3 SWS | Lecture / Practice (VÜ) | Ovtcharova, Mitarbeiter |

**Competence Certificate**  
Oral examination 20 min.

**Prerequisites**  
None

*Below you will find excerpts from events related to this course:*

**Integrated Information Systems for engineers**  
2121001, SS 2019, 3 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**
- Information systems, information management  
- CAD, CAP and CAM systems  
- PPS, ERP and PDM systems  
- Knowledge management and ontology  
- Process modeling

**Workload**  
Regular attendance: 31.5 hours, self-study: 108 hours

**Literature**  
Lecture slides
### 7.109 Course: Integrated Production Planning in the Age of Industry 4.0 [T-MACH-109054]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101272 - Integrated Production Planning

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**Events**

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<th>2150660</th>
<th>Integrated Production Planning in the Age of Industry 4.0</th>
<th>6 SWS</th>
<th>Lecture / Practice (VÜ)</th>
<th>Lanza</th>
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**Competence Certificate**  
Written Exam (120 min)

**Prerequisites**  
"T-MACH-108849 - Integrierte Produktionsplanung im Zeitalter von Industrie 4.0" as well as "T-MACH-102106 Integrierte Produktionsplanung" must not be commenced.

Below you will find excerpts from events related to this course:

### Integrated Production Planning in the Age of Industry 4.0

2150660, SS 2019, 6 SWS, Language: Deutsch, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**  
**Media:**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
Integrated production planning in the age of industry 4.0 will be taught in the context of this engineering science lecture. In addition to a comprehensive introduction to Industry 4.0, the following topics will be addressed at the beginning of the lecture:

- Basics, history and temporal development of production
- Integrated production planning and integrated digital engineering
- Principles of integrated production systems and further development with Industry 4.0

Building on this, the phases of integrated production planning are taught in accordance with VDI Guideline 5200, whereby special features of parts production and assembly are dealt with in the context of case studies:

- Factory planning system
- Definition of objectives
- Data collection and analysis
- Concept planning (structural development, structural dimensioning and rough layout)
- Detailed planning (production planning and control, fine layout, IT systems in an industry 4.0 factory)
- Preparation and monitoring of implementation
- Start-up and series support

The lecture contents are rounded off by numerous current practical examples with a strong industry 4.0 reference. Within the exercises the lecture contents are deepened and applied to specific problems and tasks.

Learning Outcomes:
The students ...

- can discuss basic questions of production technology.
- are able to apply the methods of integrated production planning they have learned about to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about for a specific problem.
- can apply the learned methods of integrated production planning to new problems.
- can use their knowledge targeted for efficient production technology.

Workload:

MACH:
regular attendance: 63 hours
self-study: 177 hours

WING:
regular attendance: 63 hours
self-study: 207 hours

Learning Content
Integrated production planning in the age of industry 4.0 will be taught in the context of this engineering science lecture. In addition to a comprehensive introduction to Industry 4.0, the following topics will be addressed at the beginning of the lecture:

- Basics, history and temporal development of production
- Integrated production planning and integrated digital engineering
- Principles of integrated production systems and further development with Industry 4.0

Building on this, the phases of integrated production planning are taught in accordance with VDI Guideline 5200, whereby special features of parts production and assembly are dealt with in the context of case studies:

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- Preparation and monitoring of implementation
- Start-up and series support

The lecture contents are rounded off by numerous current practical examples with a strong industry 4.0 reference. Within the exercises the lecture contents are deepened and applied to specific problems and tasks.
Workload
MACH:
regular attendance: 63 hours
self-study: 177 hours
WING:
regular attendance: 63 hours
self-study: 207 hours

Literature
Lecture Notes
7.110 Course: Integrative Strategies in Production and Development of High Performance Cars [T-MACH-105188]

**Responsible:** Karl-Hubert Schlichtenmayer  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

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<td>SS 2019 2150601</td>
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<td>Each summer term</td>
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**Type:** Written examination  
**Credits:** 4  
**Recurrence:** Each summer term  
**Version:** 1

**Competence Certificate**  
Written Exam (60 min)

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

**Integrative Strategies in Production and Development of High Performance Cars**  
2150601, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**  
**Media:**  
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
Notes
The lecture deals with the technical and organizational aspects of integrated development and production of sports cars on the example of Porsche AG. The lecture begins with an introduction and discussion of social trends. The deepening of standardized development processes in the automotive practice and current development strategies follow. The management of complex development projects is a first focus of the lecture. The complex interlinkage between development, production and purchasing are a second focus. Methods of analysis of technological core competencies complement the lecture. The course is strongly oriented towards the practice and is provided with many current examples.

The main topics are:

- Introduction to social trends towards high performance cars
- Automotive Production Processes
- Integrative R&D strategies and holistic capacity management
- Management of complex projects
- Interlinkage between R&D, production and purchasing
- The modern role of manufacturing from a R&D perspective
- Global R&D and production
- Methods to identify core competencies

Learning Outcomes:
The students ...

- are capable to specify the current technological and social challenges in automotive industry.
- are qualified to identify interlinkages between development processes and production systems.
- are able to explain challenges and solutions of global markets and global production of premium products.
- are able to explain modern methods to identify key competences of producing companies.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Learning Content
The lecture deals with the technical and organizational aspects of integrated development and production of sports cars on the example of Porsche AG. The lecture begins with an introduction and discussion of social trends. The deepening of standardized development processes in the automotive practice and current development strategies follow. The management of complex development projects is a first focus of the lecture. The complex interlinkage between development, production and purchasing are a second focus. Methods of analysis of technological core competencies complement the lecture. The course is strongly oriented towards the practice and is provided with many current examples.

The main topics are:

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- Integrative R&D strategies and holistic capacity management
- Management of complex projects
- Interlinkage between R&D, production and purchasing
- The modern role of manufacturing from a R&D perspective
- Global R&D and production
- Methods to identify core competencies

Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
Lecture Slides
7.111 Course: Interdisciplinary Approach to Verifiable e-Voting [T-WIWI-108716]

**Responsible:** Prof. Dr. Melanie Volkamer

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101399 - Emphasis Informatics
- M-WIWI-101426 - Electives in Informatics

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**Competence Certificate**
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

**Prerequisites**
None.

**Annotation**
The lecture will not be held in the summer semester 2019.
Course: International Finance [T-WIWI-102646]

**Responsible:** Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101402 - eFinance
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101465 - Topics in Finance I

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**Events**

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<th>Recurrence</th>
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<tbody>
<tr>
<td>SS 2019</td>
<td>International Finance</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
<td>Walter, Uhrig-Homburg</td>
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</table>

**Competence Certificate**

See German version.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

See German version.

Below you will find excerpts from events related to this course:

**International Finance**

2530570, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

**Description**

The main aspects of this course are the chances and the risks which are associated with international transactions. We carry out our analysis from two distinct perspectives: First the point of view of an international investor second that, of an international corporation. Several alternatives to the management of foreign exchange risks are shown. Due to the importance of foreign exchange risks, the first part of the course deals with currency markets. Furthermore current exchange rate theories are discussed.

**Learning Content**

The main aspects of this course are the chances and the risks which are associated with international transactions. We carry out our analysis from two distinct perspectives: First the point of view of an international investor second that, of an international corporation. Several alternatives to the management of foreign exchange risks are shown. Due to the importance of foreign exchange risks, the first part of the course deals with currency markets. Furthermore current exchange rate theories are discussed.

**Workload**

The total workload for this course is approximately 90 hours. For further information see German version.

**Literature**

**Elective literature:**
7 COURSES

T

7.113 Course: International Marketing [T-WIWI-102807]

Responsible: Dr. Sven Feurer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101424 - Foundations of Marketing

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Events

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<td>2572155</td>
<td>International Marketing</td>
<td>1 SWS</td>
<td>Lecture (V)</td>
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</table>

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Annotation
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Below you will find excerpts from events related to this course:

V

International Marketing
2572155, WS 19/20, 1 SWS, Language: Englisch, Open in study portal

Learning Content
Doing marketing abroad creates a number of significant new challenges for firms. This class is intended to prepare you for meeting these challenges. In the first session, we will discuss the peculiarities of international marketing. The next five sessions will then be dedicated to methods that can be used to address them. For instance, we will look at the following issues:

- Internationalization strategies
- Market entry strategies
- Standardization vs. individualization (e.g. regarding products, prices, and communication)
- Measurement equivalence in international market research

In the final session, we will apply this knowledge to the case of Wal Mart. In particular, Wal Mart, despite being the largest retailing company worldwide, failed to successfully enter the German Market. We will discuss Wal Mart’s failure using the methods taught in the weeks before.

Annotation
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Workload
The total workload for this course is approximately 45.0 hours. For further information see German version.

Literature
### 7.114 Course: Internship [T-WIWI-102611]

<table>
<thead>
<tr>
<th>Responsible</th>
<th>Prof. Dr. Martin Ruckes</th>
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<tr>
<td>Organisation</td>
<td>KIT Department of Economics and Management</td>
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<tr>
<td>Part of</td>
<td>M-WIWI-101419 - Internship</td>
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**Competence Certificate**
see module description

**Prerequisites**
Kein
### 7.115 Course: Introduction to Ceramics [T-MACH-100287]

<table>
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<tr>
<th>Responsible:</th>
<th>Prof. Dr. Michael Hoffmann</th>
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<td>KIT Department of Mechanical Engineering</td>
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<tr>
<td>Part of:</td>
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<td>Recurrence</td>
<td>Each winter term</td>
</tr>
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<td>Version</td>
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</table>

**Competence Certificate**

The assessment consists of an oral exam (30 min) taking place at a specific date. The re-examination is offered at a specific date.

**Prerequisites**

None
7.16 Course: Introduction to Energy Economics [T-WIWI-102746]

**Responsible:** Prof. Dr. Wolf Fichtner

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101464 - Energy Economics

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<th>SS 2019</th>
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<th>Introduction to Energy Economics</th>
<th>2 SWS</th>
<th>Lecture (V)</th>
<th>Fichtner, Sandmeier, Lehmann</th>
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<tbody>
<tr>
<td>SS 2019</td>
<td>2581011</td>
<td>Übungen zu Einführung in die Energiewirtschaft</td>
<td>2 SWS</td>
<td>Practice (Ü)</td>
<td>Lehmann, Kleinebrahm, Jochem, Sandmeier</td>
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</table>

**Competence Certificate**
The assessment consists of a written exam (90 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**
None.

_Below you will find excerpts from events related to this course:_

**Introduction to Energy Economics**
2581010, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal]

**Learning Content**
1. Introduction: terms, units, conversions
2. The energy carrier gas (reserves, resources, technologies)
3. The energy carrier oil (reserves, resources, technologies)
4. The energy carrier hard coal (reserves, resources, technologies)
5. The energy carrier lignite (reserves, resources, technologies)
6. The energy carrier uranium (reserves, resources, technologies)
7. The final carrier source electricity
8. The final carrier source heat
9. Other final energy carriers (cooling energy, hydrogen, compressed air)

**Workload**
The total workload for this course is approximately 165.0 hours. For further information see German version.

**Literature**

_Complementary literature:_
Feess, Eberhard. Umweltökonomie und Umweltpolitik. ISBN 3-8006-2187-8
7.117 Course: Introduction to Engineering Geology [T-BGU-101500]

**Responsible:** Prof. Dr. Philipp Blum

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Events**

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<tr>
<td>WS 19/20</td>
<td>6339057</td>
<td>Einführung in die Ingenieurgeologie</td>
<td>4</td>
<td>Lecture / Practice (VU)</td>
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</table>

**Prerequisites**

none

Responsible: Prof. Dr.-Ing. Alexander Fidlin
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101259 - Engineering Mechanics

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<td>Written examination</td>
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<td>Each summer term</td>
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Events

| SS 2019 | 2162238 | Introduction to Engineering Mechanics I: Statics and Strength of Materials | 2 SWS | Lecture (V) | Fidlin |
| SS 2019 | 2162239 | Übungen zu Einführung in die Technische Mechanik I: Statik und Festigkeitslehre | 1 SWS | Practice (Ü) | Fidlin, Drozdetskaya |

Competence Certificate
The assessment consists of a written examination (120 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place in every semester. Re-examinations are offered at every ordinary examination date.

For students of economics the assessment consists of a written examination (Statics - 75 min.)
Permitted utilities: non-programmable calculator

Prerequisites
None

Below you will find excerpts from events related to this course:

V Introduction to Engineering Mechanics I: Statics and Strength of Materials
2162238, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Learning Content
Statics: force · moment · general equilibrium conditions · center of mass · inner force in structure · plane frameworks · theory of adhesion
7.119 Course: Introduction to Engineering Mechanics II : Dynamics [T-MACH-102210]

**Responsible:** Prof. Dr.-Ing. Alexander Fidlin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101261 - Emphasis in Fundamentals of Engineering
- M-WIWI-101839 - Additional Fundamentals of Engineering

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**Events**

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<tr>
<td>WS 19/20</td>
<td>2161276</td>
<td>Introduction to Engineering Mechanics II : Dynamics</td>
<td>2</td>
<td>Lecture (V)</td>
<td>Fidlin</td>
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</table>

**Competence Certificate**

The assessment consists of a written examination (75 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination is offered every semester. Re-examinations are offered at every ordinary examination date.

Permitted utilities: non-programmable calculator, literature.

**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Introduction to Engineering Mechanics II : Dynamics**

2161276, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Annotation**

The credits have been changed from 4,5 to 5.
### Course: Introduction to Game Theory [T-WIWI-102850]

**Responsible:**
Prof. Dr. Clemens Puppe  
Prof. Dr. Johannes Philipp Reiß

**Organisation:**
KIT Department of Economics and Management

**Part of:**
M-WIWI-101499 - Applied Microeconomics  
M-WIWI-101501 - Economic Theory

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#### Competence Certificate
The assessment consists of a written exam (60 minutes) according to Section 4(2),1 of the examination regulation. The exam takes place in the recess period and can be resited at every ordinary examination date.

#### Prerequisites
None

#### Recommendation
Basic knowledge of mathematics and statistics is assumed.

Below you will find excerpts from events related to this course:

<table>
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<td>2 SWS</td>
<td>Lecture (V)</td>
<td></td>
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<tr>
<td>SS 2019 2520526</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
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</table>

#### Introduction to Game Theory
2520525, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

**Learning Content**
The course focusses on non-cooperative game theory. It discusses models, solution concepts, and applications for simultaneous games as well as sequential games. Various solution concepts, e.g., Nash equilibrium and subgame-perfect equilibrium, are introduced along with more advanced concepts. A short introduction to cooperative game theory is given if there is sufficient time.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

*Compulsory textbook:*

*Additional Literature:*
### 7.121 Course: Introduction to GIS for Students of Natural, Engineering and Geo Sciences [T-BGU-101681]

| Responsible       | Dr.-Ing. Norbert Rösch  
|                   | Dr.-Ing. Sven Wursthorn |
| Organisation      | KIT Department of Civil Engineering, Geo- and Environmental Sciences |
| Part of           | M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1  
|                   | M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2  
|                   | M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis |

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<th>Einführung in GIS für Studierende natur-, ingenieur- und geowissenschaftlicher Fachrichtungen, V/Ü</th>
<th>4 SWS</th>
<th>Lecture / Practice (VÜ)</th>
<th>Rösch, Wursthorn</th>
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</thead>
</table>
### Course: Introduction to GIS for Students of Natural, Engineering and Geo Sciences, Prerequisite [T-BGU-103541]

**Responsible:** Dr.-Ing. Norbert Rösch  
Dr.-Ing. Sven Wursthorn

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**  
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1  
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2  
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<td>Lecture / Practice (VÜ)</td>
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Course: Introduction to Microsystem Technology I [T-MACH-105182]

**Responsible:** Dr. Vlad Badilita  
Dr. Mazin Jouda  
Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

<table>
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**Events**

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<td>Introduction to Microsystem Technology I</td>
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**Type:** Written examination  
**Credits:** 3  
**Recurrence:** Each winter term  
**Version:** 1

**Competence Certificate**
written examination for implementation in a major field, 30 min oral exam for elective subject

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Introduction to Microsystem Technology I**

<table>
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<td>2141861</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
<td>Korvink, Badilita</td>
</tr>
</tbody>
</table>

**Learning Content**
- Introduction in Nano- and Microtechnologies  
- Silicon and processes for fabricating microelectronics circuits  
- Basic physics background and crystal structure  
- Materials for micromachining  
- Processing technologies for microfabrication  
- Silicon micromachining  
- Examples

**Workload**
Literature: 20 h  
Lessons: 21 h  
Preparation and Review: 50 h  
Exam preparation: 30 h

**Literature**
M. Madou  
Fundamentals of Microfabrication  
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011
7.124 Course: Introduction to Microsystem Technology II [T-MACH-105183]

**Responsible:** Dr. Mazin Jouda
Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

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**Events**

| SS 2019 | 2142874 | Introduction to Microsystem Technology II | 2 SWS | Lecture (V) | Korvink, Badilita |

**Competence Certificate**
written examination for major field, oral exam (30 min) for elective field

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Introduction to Microsystem Technology II**
2142874, SS 2019, 2 SWS, Language: Englisch, [Open in study portal](#)

**Lecture (V)**

**Learning Content**
- Introduction in Nano- and Microtechnologies
- Lithography
- LIGA-technique
- Mechanical microfabrication
- Patterning with lasers
- Assembly and packaging
- Microsystems

**Workload**
- Literature: 20 h
- Lessons: 21 h
- Preparation and Review: 50 h
- Exam preparation: 30 h

**Literature**
M. Madou
Fundamentals of Microfabrication
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011
7 COURSES

Course: Introduction to Operations Research I and II [T-WIWI-102758]

7.125 Course: Introduction to Operations Research I and II [T-WIWI-102758]

Responsible:
Prof. Dr. Stefan Nickel
Prof. Dr. Steffen Rebennack
Prof. Dr. Oliver Stein

Organisation:
KIT Department of Economics and Management

Part of:
M-WIWI-101418 - Introduction to Operations Research

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Events

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<td>Introduction to Operations Research I</td>
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<td>Stein</td>
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<td>WS 19/20</td>
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<td>Introduction to Operations Research II</td>
<td>2 SWS</td>
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<td>Stein</td>
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<td>WS 19/20</td>
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<td>2 SWS</td>
<td>Tutorial (Tu)</td>
<td>Assistenten, Stein</td>
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Competence Certificate

The assessment of the module is carried out by a written examination (120 minutes) according to Section 4(2), 1 of the examination regulation.

In each term (usually in March and July), one examination is held for both courses.

The overall grade of the module is the grade of the written examination.

Prerequisites

None

Recommendation

Mathematics I and II. Programming knowledge for computing exercises.

It is strongly recommended to attend the course Introduction to Operations Research I [2550040] before attending the course Introduction to Operations Research II [2530043].

Below you will find excerpts from events related to this course:

Introduction to Operations Research I

2550040, SS 2019, 2+2 SWS, Language: Deutsch, Open in study portal

Description

Examples for typical OR problems.
Linear Programming: Basic notions, simplex method, duality, special versions of the simplex method (dual simplex method, three phase method), sensitivity analysis, parametric optimization, game theory.
Graphs and Networks: Basic notions of graph theory, shortest paths in networks, project scheduling, maximal and minimal cost flows in networks.

Learning Content

Examples for typical OR problems.
Linear Programming: Basic notions, simplex method, duality, special versions of the simplex method (dual simplex method, three phase method), sensitivity analysis, parametric optimization, multicriteria optimization.
Graphs and Networks: Basic notions of graph theory, shortest paths in networks, project scheduling, maximal flows in networks.

Workload

Berechnung des Arbeitsaufwands eines durchschnittlichen Studenten um die Lernziele zu erreichen. (Intern)
Eine Vernetzung von learningoutcomes (Wissen (content), Kompetenzen (skills) und levels mit dem dafür geschätzten Arbeitsaufwand eines durchschnittlichen Studenten ist anzustreben.
Literature

7.126 Course: Introduction to Programming with Java [T-WIWI-102735]

**Responsible:** Prof. Dr.-Ing. Johann Marius Zöllner

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101581 - Introduction to Programming

**Type**
- Written examination

**Credits**
- 5

**Recurrence**
- Each winter term

**Version**
- 2

**Events**

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<td>WS 19/20</td>
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<td>Tutorien zu Programmieren I: Java</td>
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**Competence Certificate**
The assessment consists of a written resp. computer-based exam (60 min) according to Section 4 (2),1 of the examination regulation.
The successful completion of the compulsory tests in the computer lab is prerequisite for admission to the written resp. computer-based exam.
The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

**Annotation**
see german version

Below you will find excerpts from events related to this course:

**Introduction to Programming with Java**

<table>
<thead>
<tr>
<th>Code</th>
<th>Semester</th>
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<td>WS 19/20</td>
<td>Deutsch</td>
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</table>

**Learning Content**
The lecture “Introduction to Programming with Java” introduces systematic programming and provides essential practical basics for all advanced computer science lectures.

Based on considerations of the structured and systematic design of algorithms, the most important constructs of modern higher programming languages as well as programming methods are explained and illustrated with examples. One focus of the lecture is on teaching the concepts of object-oriented Programming. Java is used as the programming language. Knowledge of this language is required in advanced computer science lectures.

At the end of the lecture period, a written examination will be held for which admission must be granted during the semester after successful participation in the practices. The exact details will be announced in the lecture.

**Annotation**
see German version

**Workload**
The total workload for this course is approximately 150 hours. For further information see German version.

**Literature**
Course: Introduction to Public Finance [T-WIWI-102877]

**Responsible:** Prof. Dr. Berthold Wigger  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101403 - Public Finance

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<td>Lecture (V)</td>
<td>3 SWS</td>
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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation SPO 2015.

**Prerequisites**
None

**Below you will find excerpts from events related to this course:**

**Introduction to Public Finance**
2560131, WS 19/20, 3 SWS, Language: Deutsch, Open in study portal

**Learning Content**
The course *Introduction to Public Finance* provides an overview of the fundamental issues in public economics. The first part of the course deals with normative theories about the economic role of the state in a market economy. Welfare economics theory is offered as a base model, with which alternative normative theories are compared and contrasted. Within this theoretical framework, arguments concerning efficiency and equity are developed as justification for varying degrees of economic intervention by the state. The second part of the course deals with the positivist theory of public economics. Processes of public decision making are examined and the conditions that lead to market failures resulting from collective action problems are discussed. The third part of the course examines a variety of public spending programs, including social security systems, the public education system, and programs aimed at reducing poverty. The fifth part of the course addresses the key theoretical and political issues associated with fiscal federalism.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**
7.128 Course: Introduction to Stochastic Optimization [T-WIWI-106546]

**Responsible:** Prof. Dr. Steffen Rebennack

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101414 - Methodical Foundations of OR
- M-WIWI-103278 - Optimization under Uncertainty

**Type**
- Written examination

**Credits**
- 4.5

**Recurrence**
- Each summer term

**Version**
- 1

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**Competence Certificate**
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

**Prerequisites**
None.
7.129 Course: Investments [T-WIWI-102604]

**Responsible:** Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101435 - Essentials of Finance

**Type:** Written examination  
**Credits:** 4.5  
**Recurrence:** Each summer term  
**Version:** 1

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**Competence Certificate**

The assessment consists of a written exam (75 min) according to Section 4(2), 1 of the examination regulation. The examination takes place in every semester. Re-examinations are offered at every ordinary examination date. A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**

None

**Recommendation**

Knowledge of Business Administration: Finance and Accounting [2610026] is recommended.

Below you will find excerpts from events related to this course:

**Investments**

2530575, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)  

**Description**

The lecture deals with investment decisions under uncertainty, where the main emphasis is on investment decisions on stock markets. After a discussion of the basic questions of corporate valuation, the lecture focuses on portfolio theory. After that, risk and return in equilibrium are derived using the Capital Asset Pricing Model and the Arbitrage Pricing Theory, followed by an introduction into derivatives markets, especially forwards and futures. The lecture concludes with investments on bond markets.

**Learning Content**

The lecture deals with investment decisions under uncertainty, where the main emphasis is on investment decisions on stock markets. After a discussion of the basic questions of corporate valuation, the lecture focuses on portfolio theory. After that, risk and return in equilibrium are derived using the Capital Asset Pricing Model and the Arbitrage Pricing Theory. The lecture concludes with investments on bond markets.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

Elective literature:  
7.130 Course: Laboratory Production Metrology [T-MACH-108878]

**Responsible:** Dr.-Ing. Benjamin Häfner

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

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**Competence Certificate**

Alternative Test Achievement: Group presentation of 15 min at the beginning of each experiment and evaluation of the participation during the experiments

and

Oral Exam (15 min)

**Prerequisites**

none

**Annotation**

For organizational reasons the number of participants for the course is limited. Hence an selection process will take place. Applications are made via the homepage of wbk [http://www.wbk.kit.edu/studium-und-lehre.php](http://www.wbk.kit.edu/studium-und-lehre.php).

**Below you will find excerpts from events related to this course:**

**Laboratory Production Metrology**

2150550, SS 2019, 3 SWS, Language: Deutsch, [Open in study portal](http://www.wbk.kit.edu/studium-und-lehre.php)

**Description**

Lecture notes will be provided in Ilias ([https://ilias.studium.kit.edu/](https://ilias.studium.kit.edu/)). Additional reference to literature will be provided, as well.
Notes
During this course, students get to know measurement systems that are used in a production system. In the age of Industry 4.0, sensors are becoming more important. Therefore, the application of in-line measurement technology such as machine vision and non-destructive testing is focussed. Additionally, laboratory based measurement technologies such as computed tomography are addressed. The student learn the theoretical background as well as practical applications for industrial examples. The students use sensors by themselves during the course. Additionally, they are trained on how to integrate sensors in production processes and how to analyze measurement data with suitable software.

The following topics are addressed:

- Classification and examples for different measurement technologies in a production environment
- Machine vision with optical sensors
- Information fusion based on optical measurements
- Robot-based optical measurements
- Non-destructive testing by means of acoustic measurements
- Coordinate measurement technology
- Industrial computed tomography
- Measurement uncertainty evaluation
- Analysis of production data by means of data mining

Learning Outcomes:
The students ...

- are able to name, describe and mark out different measurement technologies that are relevant in a production environment.
- are able to conduct measurements with the presented in-line and laboratory based measurement systems.
- are able to analyze measurement results and assess the measurement uncertainty of these.
- are able to deduce whether a work piece fulfills quality relevant specifications by analysing measurement results.
- are able to use the presented measurement technologies for a new task.

Workload:
regular attendance: 31,5 hours
self-study: 88,5 hours

Learning Content
During this course, students get to know measurement systems that are used in a production system. In the age of Industry 4.0, sensors are becoming more important. Therefore, the application of in-line measurement technology such as machine vision and non-destructive testing is focussed. Additionally, laboratory based measurement technologies such as computed tomography are addressed. The student learn the theoretical background as well as practical applications for industrial examples. The students use sensors by themselves during the course. Additionally, they are trained on how to integrate sensors in production processes and how to analyze measurement data with suitable software. The following topics are addressed:

- Classification and examples for different measurement technologies in a production environment
- Machine vision with optical sensors
- Information fusion based on optical measurements
- Robot-based optical measurements
- Non-destructive testing by means of acoustic measurements
- Coordinate measurement technology
- Industrial computed tomography
- Measurement uncertainty evaluation
- Analysis of production data by means of data mining

Workload
regular attendance: 31.5 hours
self-study: 88.5 hours
7.131 Course: Learning Factory “Global Production” [T-MACH-105783]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101284 - Specialization in Production Engineering

<table>
<thead>
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<th>Recurrence</th>
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<td>Each winter term</td>
<td>3</td>
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<tr>
<td>2149612</td>
<td>Learning Factory “Global Production”</td>
<td></td>
<td></td>
<td>Lanza</td>
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**Competence Certificate**  
Alternative test achievement (graded):
- Knowledge acquisition in the context of the seminar (3 achievements 20 min each) with weighting 40%.
- Interaction between participants with weighting 15%.
- Scientific colloquium (in groups of 3 students approx. 45 min each) with weighting 45%.

**Prerequisites**  
none

**Annotation**  
For organisational reasons, the number of participants for the course is limited to 20. As a result, a selection process will take place.
Applications must be submitted via the wbk homepage (http://www.wbk.kit.edu/studium-und-lehre.php).
Due to the limited number of participants, advance registration is required.
Students should have previous knowledge in at least one of the following areas:
- Integrated Production Planning  
- Global Production and Logistics  
- Quality Management

Below you will find excerpts from events related to this course:

**Description**  
**Media:**
E-learning platform ilias, powerpoint, photo protocol. The media are provided through ilias (https://ilias.studium.kit.edu/).
Notes
The learning factory “Global Production” serves as a modern teaching environment for the challenges of global production. To make these challenges come alive, students can run a production of electric motors under real production conditions. The course is divided into e-learning units and presence dates. The e-learning units help to learn essential basics and to immerse themselves in specific topics (e.g. selection of location, supplier selection and planning of production networks). The focus of the presence appointments is the case-specific application of relevant methods for planning and control of production systems that are suitable for the location. In addition to traditional methods and tools to organize lean production systems (e.g. Kanban and JIT/ JIS, Line Balancing) the lecture in particular deals with site-specific quality assurance and scalable automation. Essential methods for quality assurance in complex production systems are taught and brought to practical experience by a Six Sigma project. In the area of scalable automation, it is important to find solutions for the adaption of the level of automation of the production system to the local production conditions (e.g. automated workpiece transport, integration of lightweight robots for process linking) and to implement them physically. At the same time safety concepts should be developed and implemented as enablers for human-robot collaboration.

The course also includes an excursion to the production plant for the manufacturing of electric motors of an industrial partner.

Main focus of the lecture:
- site selection
- site-specific factory planning
- site-specific quality assurance
- scalable automation
- supplier selection

Learning Outcomes:
The students are able to …
- evaluate and select alternative locations using appropriate methods.
- use methods and tools of lean management to plan and manage production systems that are suitable for the location.
- use the Six Sigma method and apply goal-oriented process management.
- select an appropriate level of automation of the production units based on quantitative variables.
- make use of well-established methods for the evaluation and selection of suppliers.
- apply methods for planning a global production network depending on company-specific circumstances to sketch a suitable network and classify and evaluating it according to specific criteria.
- apply the learned methods and approaches with regard to problem solving in a global production environment and able to reflect their effectiveness.

Workload:
e-Learning: ~ 24 h
Regular attendance: ~ 36 h
Self-study: ~ 60 h

Learning Content
The learning factory “Global Production” serves as a modern teaching environment for the challenges of global production. To make these challenges come alive, students can run a production of electric motors under real production conditions. The course is divided into e-learning units and presence dates. The e-learning units help to learn essential basics and to immerse themselves in specific topics (e.g. selection of location, supplier selection and planning of production networks). The focus of the presence appointments is the case-specific application of relevant methods for planning and control of production systems that are suitable for the location. In addition to traditional methods and tools to organize lean production systems (e.g. Kanban and JIT/ JIS, Line Balancing) the lecture in particular deals with site-specific quality assurance and scalable automation. Essential methods for quality assurance in complex production systems are taught and brought to practical experience by a Six Sigma project. In the area of scalable automation, it is important to find solutions for the adaption of the level of automation of the production system to the local production conditions (e.g. automated workpiece transport, integration of lightweight robots for process linking) and to implement them physically. At the same time safety concepts should be developed and implemented as enablers for human-robot collaboration.

The course also includes an excursion to the production plant for the manufacturing of electric motors of an industrial partner.

Main focus of the lecture:
- site selection
- site-specific factory planning
- site-specific quality assurance
- scalable automation
- supplier selection
Annotation
For organisational reasons, the number of participants for the course is limited to 20. As a result, a selection process will take place. Applications must be submitted via the wbk homepage (http://www.wbk.kit.edu/studium-und-lehre.php).

Due to the limited number of participants, advance registration is required. Students should have previous knowledge in at least one of the following areas:

- Integrated Production Planning
- Global Production and Logistics
- Quality Management

Workload
- e-Learning: ~ 24 h
- regular attendance: ~ 36 h
- self-study: ~ 60 h
### 7.132 Course: Logistics - Organisation, Design and Control of Logistic Systems [T-MACH-102089]

**Responsible:** Prof. Dr.-Ing. Kai Furmans  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-WIWI-101421 - Supply Chain Management

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**Competence Certificate**

The assessment consists of a 90 minutes written examination (according to §4(2), 1 of the examination regulation).

**Prerequisites**

None

**Recommendation**

Required are lectures on "Linear Algebra" and "Stochastic".

---

Below you will find excerpts from events related to this course:

### Logistics - Organisation, Design, and Control of Logistic Systems

**2118078, SS 2019, 3 SWS, Language: Deutsch, Open in study portal**

**Lecture (V)**

**Description**

**Media:**

Blackboard, LCD projector, in exercises also PCs.
Learning Content

Introduction

- historical overview
- lines of development

Structure of logistics systems

Distribution logistics

- location planning
- Vehicle Routing Planning
- distribution centers

Inventory management

- demand forecasting
- Inventory management policies
- Bullwhip effect

Production logistics

- layout planning
- material handling
- flow control

Supply Management

- information flow
- transportation organization
- controlling and development of a logistics system
- co-operation mechanisms
- Lean SCM
- SCOR model

Identification Technologies

Workload

180 hrs

Literature

- Arnold/Isermann/Kuhn/Tempelmeier. Handbuch Logistik, Springer Verlag, 2002 (Neuauflage in Arbeit)
- Domschke. Logistik, Rundreisen und Touren, Oldenbourg Verlag, 1982
- Domschke/Drexel. Logistik, Standorte, Oldenbourg Verlag, 1996
- Gudehus. Logistik, Springer Verlag, 2007
- Tempelmeier. Bestandsmanagement in Supply Chains, Books on Demand 2006
Course: Logistics and Supply Chain Management [T-WIWI-102870]

**Responsible:** Dr. Marcus Wiens  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101437 - Industrial Production I

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<td>1 SWS</td>
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**Competence Certificate**

The assessment consists of an oral (30 minutes) or a written (60 minutes) exam (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Logistics and Supply Chain Management**  
2581996, SS 2019, 2 SWS, Language: Englisch, [Open in study portal](#)  
Lecture (V)

**Learning Content**

- Introduction: Basic Terms and Concepts
- Logistics Systems and Supply Chain Management
- Supply Chain Risk Management
- Extensions and Applications

**Workload**

Total effort required will account for approximately 105h (3.5 credits).

**Literature**

will be announced in the course
7 COURSES

T

7.134 Course: Machine Tools and Industrial Handling [T-MACH-102158]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101286 - Machine Tools and Industrial Handling

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</table>

Competence Certificate
Written exam (120 minutes)

Prerequisites
"T-MACH-109055 - Werkzeugmaschinen und Handhabungstechnik" must not be commenced.

Below you will find excerpts from events related to this course:

Machine Tools and Industrial Handling
2149902, WS 19/20, 6 SWS, Language: Deutsch, Open in study portal

Description
Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
The lecture gives an overview of the construction, use and application of machine tools and industrial handling equipment. In the course of the lecture a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools is conveyed. First, the main components of the machine tools are systematically explained and their design principles as well as the integral machine tool design are discussed. Subsequently, the use and application of machine tools will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0.

The individual topics are:

- Frames and frame components
- Feed axes
- Spindles
- Peripheral equipment
- Control unit
- Metrological evaluation and machine testing
- Process monitoring
- Maintenance of machine tools
- Safety assessment of machine tools
- Machine examples

Learning Outcomes:
The students ...

- are able to assess the use and application of machine tools and handling equipment and to differentiate between them in terms of their characteristics and design.
- can describe and discuss the essential elements of the machine tool (frame, main spindle, feed axes, peripheral equipment, control unit).
- are able to select and dimension the essential components of a machine tool.
- are capable of selecting and evaluating machine tools according to technical and economic criteria.

Workload:

MACH:
regular attendance: 63 hours
self-study: 177 hours

WING:
regular attendance: 63 hours
self-study: 207 hours

Learning Content
The lecture gives an overview of the construction, use and application of machine tools and industrial handling equipment. In the course of the lecture a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools is conveyed. First, the main components of the machine tools are systematically explained and their design principles as well as the integral machine tool design are discussed. Subsequently, the use and application of machine tools will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0.

The individual topics are:

- Frames and frame components
- Feed axes
- Spindles
- Peripheral equipment
- Control unit
- Metrological evaluation and machine testing
- Process monitoring
- Maintenance of machine tools
- Safety assessment of machine tools
- Machine examples

Annotation
None
Workload
MACH:
regular attendance: 63 hours
self-study: 177 hours
WİNG:/TVWL
regular attendance: 63 hours
self-study: 207 hours
Course: Macroeconomic Theory [T-WIWI-109121]

Responsible: Prof. Dr. Johannes Brumm
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101501 - Economic Theory
          M-WIWI-101668 - Economic Policy I

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Competence Certificate

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Prerequisites

Successful completion of all relevant modules from the basic program.

Below you will find excerpts from events related to this course:

Macroeconomic Theory

2560404, WS 19/20, 2 SWS, Language: Englisch, Open in study portal

Description

This course introduces a modern approach to macroeconomics by building on microeconomic principles. To be able to rigorously address key macroeconomic questions a general framework based on intertemporal decision making is introduced. Starting by the principles of consumer and firm behavior, this framework is successively expanded by introducing market imperfections, monetary factors as well as international trade. With this framework at hand students are able to analyze labor market policies, government deficits, monetary policy, financial crises, trade policy, and other important macroeconomic problems. Throughout the course, we not only point out the power of theory but also its limitations.

Workload

The total workload for this course is approximately 135 hours. For further information see the German version.

Literature

Literature and lecture notes are provided during the course.
## Course: Management Accounting 1 [T-WIWI-102800]

### Responsible:
Prof. Dr. Marcus Wouters

### Organisation:
KIT Department of Economics and Management

### Part of:
M-WIWI-101498 - Management Accounting

### Type:
Written examination

### Credits:
4.5

### Recurrence:
Each summer term

### Version:
2

### Competence Certificate
The assessment consists of a written exam (120 minutes) (following §4(2), 1 of the examination regulation) at the end of each semester.

### Prerequisites
None

### Annotation
Students in the Bachelor’ program can only take the related tutorial and examination. Students in the Master’s program (and Bachelor’s students who are already completing examinations for their Master’s program) can only take the related tutorial and examination.

Below you will find excerpts from events related to this course:

### Management Accounting 1
2579900, SS 2019, 2 SWS, Language: Englisch, Open in study portal

#### Notes
see Module Handbook

#### Learning Content
The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA1 are: short-term planning, investment decisions, budgeting and activity-based costing.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

#### Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.

#### Literature
- In addition, several papers that will be available on ILIAS.

### Übung zu Management Accounting 1
2579901, SS 2019, 2 SWS, Language: Englisch, Open in study portal

#### Practice (Ü)
Notes
see Module Handbook
7.137 Course: Management Accounting 2 [T-WIWI-102801]

**Responsible:** Prof. Dr. Marcus Wouters  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101498 - Management Accounting

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**Competence Certificate**
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation) at the end of each semester.

**Prerequisites**
None

**Recommendation**
It is recommended to take part in the course "Management Accounting 1" before this course.

**Annotation**
Students in the Bachelor’s program can only take the related tutorial and examination. Students in the Master’s program (and Bachelor’s students who are already completing examinations for their Master’s program) can only take the related tutorial and examination.

Below you will find excerpts from events related to this course:

**Management Accounting 2**  
2579903, WS 19/20, 2 SWS, Language: Englisch, [Open in study portal](#)

**Notes**
see Module Handbook

**Learning Content**
The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA2 are: cost estimation, product costing and cost allocation, financial performance measures, transfer pricing, strategic performance measurement systems and customer value propositions. We will use international material written in English. We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**
  In addition, several papers that will be available on ILIAS.
Course: Management Accounting 2 [T-WIWI-102801]

Notes
see Module Handbook
Course: Management and Strategy [T-WIWI-102629]

**Responsible:** Prof. Dr. Hagen Lindstädt

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101425 - Strategy and Organization

**Type:** Written examination

**Credits:** 3.5

**Recurrence:** Each summer term

**Version:** 1

**Events**

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**Competence Certificate**

The assessment consists of a written exam (60 min) taking place at the beginn of the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Description**

- Corporate management principles
- Strategic management principles
- Strategic analysis
- Competitive strategy: modelling and selection on a divisional level
- Strategies for oligopolies and networks: anticipation of dependencies
- Corporate strategy: modelling and evaluation on a corporate level
- Strategy implementation

**Learning Content**

The participants learn about central concepts of strategic management along the idealotypical strategy process: internal and external strategic analysis, concept and sources of competitive advantages, their importance when establishing competitive and corporate strategies as well as strategy assessment and implementation. This aims in particular to provide a summary of the basic concepts and models of strategic management, i.e. to provide in particular an action-oriented integration. Thereby a focus is on imparting knowledge about how price developments in oligopolistic markets can be understood, modeled and forecasted based on game theory.

**Annotation**

The credits for the course "Management and Strategy" have been changed from 4 to 3.5 from summer term 2015 on.

**Workload**

The total workload for this course is approximately 105.0 hours. For further information see German version.

**Literature**


The relevant excerpts and additional sources are made known during the course.
Course: Managing Organizations [T-WIWI-102630]

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101425 - Strategy and Organization
           M-WIWI-101513 - Human Resources and Organizations

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Competence Certificate
The assessment will consist of a written exam (60 min) taking place at the beginning of the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Below you will find excerpts from events related to this course:

Managing Organizations 2577902, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Description
- Principles of organisational management
- Managing organisational structures and processes: the selection of design parameters
- Ideal-typical organisational structures: choice and effect of parameter combinations
- Managing organisational changes

Learning Content
The course should enable the participants to assess the strengths and weaknesses of existing organisational structures and rules using systematic criteria. Here concepts and models for designing organisation structures, regulating organizational processes and managing organisational changes are presented and discussed using case studies. The course is structured to relate to actions and aims to give students a realistic view of the opportunities and limits of rational design approaches.

Annotation
The credits for the course "Managing Organizations" have been changed from 4 to 3.5 from summer term 2015 on.

Workload
The total workload for this course is approximately 105.0 hours. For further information see German version.

Literature

The relevant excerpts and additional sources are made known during the course.
7.140 Course: Managing the Marketing Mix [T-WIWI-102805]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101424 - Foundations of Marketing

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Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation) as well as a case study presentation according to §4(2), 3 SPO 2007/ §4(2), 3 SPO 2015. The grade consists of the grade of the written examination (two thirds) and the grade of the presentation (one third).

Prerequisites
None

Annotation
The course is compulsory in the module “Foundations of Marketing”. For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Below you will find excerpts from events related to this course:

Managing the Marketing Mix
2571152, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Learning Content
The content of this course concentrates on the elements of the marketing mix. Therefore the main chapters are:

- Brand management
- Pricing
- Promotion

Annotation
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.
7.141 Course: Manufacturing Technology [T-MACH-102105]

**Responsible:** Prof. Dr.-Ing. Volker Schulze  
Dr.-Ing. Frederik Zanger

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101276 - Manufacturing Technology

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**Competence Certificate**

Written Exam (180 min)

**Prerequisites**

none

*Below you will find excerpts from events related to this course:

**Manufacturing Technology**

2149657, WS 19/20, 6 SWS, Language: Deutsch, [Open in study portal](https://ilias.studium.kit.edu/).

**Description**

**Media:**

Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).
Notes
The objective of the lecture is to look at manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to impart detailed process knowledge of the common processes. The lecture covers the basic principles of manufacturing technology and deals with the manufacturing processes according to their classification into main groups regarding technical and economic aspects. The lecture is completed with topics such as process chains in manufacturing.

The following topics will be covered:

- Quality control
- Primary processing (casting, plastics engineering, sintering, additive manufacturing processes)
- Forming (sheet-metal forming, massive forming, plastics engineering)
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment
- Process chains in manufacturing

This lecture provides an excursion to an industry company.

Learning Outcomes:
The students ...

- are capable to specify the different manufacturing processes and to explain their functions.
- are able to classify the manufacturing processes by their general structure and functionality according to the specific main groups.
- have the ability to perform a process selection based on their specific characteristics.
- are enabled to identify correlations between different processes and to select a process regarding possible applications.
- are qualified to evaluate different processes regarding specific applications based on technical and economic aspects.
- are experienced to classify manufacturing processes in a process chain and to evaluate their specific influence on surface integrity of workpieces regarding the entire process chain.

Workload:
regular attendance: 63 hours
self-study: 177 hours

Learning Content
The objective of the lecture is to look at manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to impart detailed process knowledge of the common processes. The lecture covers the basic principles of manufacturing technology and deals with the manufacturing processes according to their classification into main groups regarding technical and economic aspects. The lecture is completed with topics such as process chains in manufacturing.

The following topics will be covered:

- Quality control
- Primary processing (casting, plastics engineering, sintering, additive manufacturing processes)
- Forming (sheet-metal forming, massive forming, plastics engineering)
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment
- Process chains in manufacturing

This lecture provides an excursion to an industry company.

Annotation
None

Workload
regular attendance: 63 hours
self-study: 177 hours

Literature
Lecture Notes
7.142 Course: Material Flow in Logistic Systems [T-MACH-102151]

**Responsible:** Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101269 - Introduction to Technical Logistics
- M-MACH-101277 - Material Flow in Logistic Systems

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**Events**

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<td>WS 19/20</td>
<td>2117051</td>
<td>Material flow in logistic systems</td>
<td>6 SWS</td>
<td>Others (sonst.)</td>
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</table>

**Competence Certificate**

The assessment (Prüfungsleistung anderer Art) consists of the following assignments:

- 40% assessment of the final case study as individual performance,
- 60% semester evaluation which includes working on 5 case studies and defending those (For both assessment types, the best 4 of 5 tries count for the final grade.):
  - 40% assessment of the result of the case studies as group work,
  - 20% assessment of the oral examination during the case study colloquiums as individual performance.

A detailed description of the learning control can be found under Annotations.

**Prerequisites**

none

**Recommendation**

Recommended elective subject: Probability Theory and Statistics

**Annotation**

Students are divided into groups for this course. Five case studies are carried out in these groups. The results of the group work during the lecture period are presented and evaluated in writing. In the oral examination during the case study colloquiums, the understanding of the result of the group work and the models dealt with in the course is tested. The participation in the oral defenses is compulsory and will be controlled. For the written submission the group receives a common grade, in the oral defense each group member is evaluated individually.

After the lecture period, there is the final case study. This case study contains the curriculum of the whole semester. The students work individually on this case study which takes place at a predefined place and time (duration: 4h).

**Below you will find excerpts from events related to this course:**

**Material flow in logistic systems**

2117051, WS 19/20, 6 SWS, Language: Deutsch, Open in study portal

**Description**

Students are divided into groups for this course. Five case studies are carried out in these groups. The results of the group work during the lecture period are presented and evaluated in writing. During the colloquiums, the result of the case study is presented and the understanding of the group work and the models dealt with in the course are tested in an oral defense. The participation in the colloquiums is compulsory and will be controlled. For the written submission and the presentation the group receives a common grade, in the oral defense each group member is evaluated individually.

After the lecture period, there is the final case study. This case study contains the curriculum of the whole semester. The students work individually on this case study which takes place at a predefined place and time (duration: 4h).

**Media:** Presentations, black board, book, video recordings
Learning Content

- Elements of material flow systems (conveyor elements, fork, join elements)
- Models of material flow networks using graph theory and matrices
- Queueing theory, calculation of waiting time, utilization
- Warehouseing and order-picking
- Shuttle systems
- Sorting systems
- Simulation
- Calculation of availability and reliability
- Value stream analysis

Annotation
none

Workload
Regular attendance: 35 h
Self-study: 135 h
Group work: 100 h

Literature
Arnold, Dieter; Furmans, Kai: Materialfluss in Logistiksystemen; Springer-Verlag Berlin Heidelberg, 2009
**7.143 Course: Material Science II for Business Engineers [T-MACH-102079]**

**Responsible:** Prof. Dr. Michael Hoffmann  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101261 - Emphasis in Fundamentals of Engineering  
M-MACH-101262 - Emphasis Materials Science  
M-WIWI-101839 - Additional Fundamentals of Engineering

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**Events**

| Events | SS 2019 | 2126782 | Materials Science II for Business Engineers | 2 SWS | Lecture (V) | Hoffmann |

**Competence Certificate**  
The assessment consists of a written examination (150 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the winter term is carried out by a written or oral exam.

**Prerequisites**  
The module *Material Science* has to be completed beforehand.

Below you will find excerpts from events related to this course:

**Materials Science II for Business Engineers**

**Learning Content**  
The course gives an overview of different heat treatments for steels to obtain defined microstructures such as martensite or pearlite and discusses their impact on the mechanical properties. Different thermally activated processes, such as diffusion, creep, recovery and recrystallization are introduced and analyzed and terms of their relevance for materials engineering. Heat treatments and thermally activated processes are also related to aluminium and copper alloys. The second part of the course covers structure, processing and applications of polymers, nonmetallic inorganic glasses and ceramics. Finally an overview is given of the most important materials testing methods.

**Workload**  
regular attendance: 32 hours  
self-study: 118 hours

**Literature**

**Elective literature:**

**T.144 Course: Materials Science I [T-MACH-102078]**

**Responsible:** Prof. Dr. Michael Hoffmann  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101260 - Materials Science

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**Competence Certificate**  
The assessment consists of a written examination (150 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the summer term is carried out by a written or oral exam.

**Prerequisites**  
None
7.145 Course: Mathematics I - Final Exam [T-MATH-102261]

**Responsible:**
Dr. Martin Folkers  
Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
PD Dr. Steffen Winter

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-101676 - Mathematics 1

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Industrial Engineering and Management B.Sc.  
Module Handbook as of 23.08.2019
## Course: Mathematics I - Midterm Exam [T-MATH-102260]

### Responsible:
- Dr. Martin Folkers
- Prof. Dr. Daniel Hug
- Prof. Dr. Günter Last
- PD Dr. Steffen Winter

### Organisation:
- KIT Department of Mathematics

### Part of:
- M-MATH-101676 - Mathematics 1

### Type
- Written examination

### Credits
- 3.5

### Version
- 1

### Events

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7.147 Course: Mathematics II - Final Exam [T-MATH-102263]

**Responsible:** Dr. Martin Folkers  
Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
PD Dr. Steffen Winter

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-101677 - Mathematics 2

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Industrial Engineering and Management B.Sc.  
Module Handbook as of 23.08.2019
7.148 Course: Mathematics II - Midterm Exam [T-MATH-102262]

**Responsible:** Dr. Martin Folkers  
Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
PD Dr. Steffen Winter

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-101677 - Mathematics 2

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7.149 Course: Mathematics III - Final Exam [T-MATH-102264]

**Responsible:**  
Dr. Martin Folkers  
Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
PD Dr. Steffen Winter

**Organisation:**  
KIT Department of Mathematics

**Part of:**  
M-MATH-101679 - Mathematics 3

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Course: Mechanical Design Basics I and II [T-MACH-110363]

**Responsible:** Prof. Dr.-Ing. Albert Albers  
Prof. Dr.-Ing. Sven Matthiesen

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101299 - Mechanical Design

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<td>Lecture (V)</td>
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**Competence Certificate**
Written Exam (90min) on the topics of MKLGI and MKLGII.

**Prerequisites**

Below you will find excerpts from events related to this course:

**Mechanical Design Basics II**
2146131, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

**Description**

**Media:**
- Beamer
- Visualizer
- Mechanical components

**Notes**
- Design
- Dimensioning
- Component connections
- Bolted connection

**Prerequisites:**
**MIT:**
In a workshop with 3 project sessions the students will be divided into groups and their knowledge will be tested. Attendance in all 3 project sessions is compulsory and is checked. In colloquia the knowledge from the lecture will be tested at the beginning of the project sessions. The successful completion of the colloquia as well as the completion of the workshop task is a prerequisite for successful participation.

**CIW/VT/IP-M/WiING/NWT/MATH/MWT:**
During the lecture, students must apply the knowledge from MKL I and II to a design task. This is then evaluated and must be passed for successful participation.

**Workload:**
- Presence time: 21 h
- Self study: 51 h
Learning Content
Sealings
Design
Dimensioning
Component connections
Bolt connection
Tutorials take place in concomitant to the lectures.

Annotation
Lecture notes:
The Productdevelopment knowledge base PKB will be provided in digital form for registered students. All lecture notes and additional slides will be provided in Ilias.

Workload
regular attendance: 42 h
self-study: 80 h

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X,
also available as electronic paper at the KIT catalogue.
Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

Mechanical Design Basics I
2145131, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Description
Media:
Beamer
Visualizer
Mechanical components

Learning Content
Introduction in product engineering
Tools of visualization (technical drawing)
Product manufacturing as problem solving
Product manufacturing of technical systems:
  • system theory
  • Contact and Channel C&C³-A

Basics of chosen design- and machining elements
  • springs
  • bearings
  • sealings

Concomitant to the lectures tutorials take place with the following contents:
Gear workshop
Tutorial "tools of visualization (technical drawing)"
Tutorial "technical systems product development, sytem theory, Contact and Chanel C&C³-A"
Tutorial "springs"
Tutorial "bearing and bearing arrangements"
Annotation
Lecture notes:
The Product development knowledge base PKB will be provided in digital form for registered students. All lecture notes and additional slides will be provided in Ilias.

Workload
regular attendance: 42 h
self-study: 80 h

Literature
Lecture notes:
The lecture notes can be downloaded via the eLearning platform Ilias.

Literature:
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
or per full text access provided by university library
Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8


### Tutorials Mechanical Design Basics I

**Course**: Mechanical Design Basics I, Tutorial [T-MACH-110364]

**Responsible**: Prof. Dr.-Ing. Albert Albers  
Prof. Dr.-Ing. Sven Matthiesen

**Organisation**: KIT Department of Mechanical Engineering

**Part of**: M-MACH-101299 - Mechanical Design

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**Type**  
Completed coursework

**Credits**  
1

**Recurrence**  
Each winter term

**Version**  
1

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**Events**

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**Competence Certificate**

To pass the preliminary work, attendance at 3 workshop sessions of the MKL1 transmission workshop and the passing of a colloquium at the beginning of each workshop are prerequisites.

**Prerequisites**

None

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*Below you will find excerpts from events related to this course:*

**V Tutorials Mechanical Design Basics I**

**2145132, WS 19/20, 1 SWS, Language: Deutsch, Open in study portal**

**Description**

**Media:**
- Beamer
- Visualizer
- Gear box (Workshop)

**Learning Content**

Gear workshop

- Tutorial "tools of visualization (technical drawing)"
- Tutorial "technical systems product development, system theory, element model C&CM"
- Tutorial "springs"
- Tutorial "bearing and bearing arrangements"

**Literature**

**Konstruktionselemente des Maschinenbaus** - 1 und 2


**CAD:**


Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)
### 7.152 Course: Mechanical Design Basics II, Tutorial [T-MACH-110365]

**Responsible:** Prof. Dr.-Ing. Albert Albers  
Prof. Dr.-Ing. Sven Matthiesen  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101299 - Mechanical Design

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<td>Each summer term</td>
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**Competence Certificate**  
CIW/ VT/ IP-M/ WiING/ NWT/ MATH/ MWT: For passing the prerequisite it is necessary that a design task is successfully completed as a technical hand drawing  
MIT: To pass the preliminary examination, attendance at workshop sessions and a colloquium at the beginning of each workshop are required.

**Prerequisites**  
None

**Below you will find excerpts from events related to this course:**

**Tutorials Mechanical Design Basics II**  
2146132, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Description**  
**Media:**  
Beamer  
Visualizer

**Notes**  
Design  
Dimensioning  
Component connections  
Bolted connection

**Workload:**  
**MIT Students:**  
Presence time: 18 h  
Self study: 30 h  

**CIW/ VT/ IP-M/ WiING/ NWT/ MATH/ MWT**  
Presence time: 10,5 h  
Self study: 37,5 h

**Learning Content**  
Bearings  
Sealings  
Design  
Tolerances and fittings  
Shaft-hub connections
Literature

**Konstruktionselemente des Maschinenbaus - 1 und 2**

**Grundlagen von Maschinenelementen für Antriebsaufgaben:**
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

**CAD:**
Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)
7.153 Course: Metal Forming [T-MACH-105177]

**Responsible:** Dr.-Ing. Thomas Herlan  
**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101284 - Specialization in Production Engineering

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**Competence Certificate**  
Oral Exam (20 min)

**Prerequisites**  
none

Below you will find excerpts from events related to this course:

**Metal Forming**  
2150681, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

**Description**  
Media:  
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
At the beginning of the lecture the basics of metal forming are briefly introduced. The focus of the lecture is on massive forming (forging, extrusion, rolling) and sheet forming (car body forming, deep drawing, stretch drawing). This includes the systematic treatment of the appropriate metal forming Machines and the corresponding tool technology. Aspects of tribology, as well as basics in material science and aspects of production planning are also discussed briefly. The plastic theory is presented to the extent necessary in order to present the numerical simulation method and the FEM computation of forming processes or tool design. The lecture will be completed by product samples from the forming technology.

The topics are as follows:

- Introduction and basics
- Hot forming
- Metal forming machines
- Tools
- Metallographic fundamentals
- Plastic theory
- Tribology
- Sheet forming
- Extrusion
- Numerical simulation

Learning Outcomes:
The students ...

- are able to reflect the basics, forming processes, tools, Machines and equipment of metal forming in an integrated and systematic way.
- are capable to illustrate the differences between the forming processes, tools, machines and equipment with concrete examples and are qualified to analyze and assess them in terms of their suitability for the particular application.
- are also able to transfer and apply the acquired knowledge to other metal forming problems.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Learning Content
At the beginning of the lecture the basics of metal forming are briefly introduced. The focus of the lecture is on massive forming (forging, extrusion, rolling) and sheet forming (car body forming, deep drawing, stretch drawing). This includes the systematic treatment of the appropriate metal forming Machines and the corresponding tool technology. Aspects of tribology, as well as basics in material science and aspects of production planning are also discussed briefly. The plastic theory is presented to the extent necessary in order to present the numerical simulation method and the FEM computation of forming processes or tool design. The lecture will be completed by product samples from the forming technology.

The topics are as follows:

- Introduction and basics
- Hot forming
- Metal forming machines
- Tools
- Metallographic fundamentals
- Plastic theory
- Tribology
- Sheet forming
- Extrusion
- Numerical simulation

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours
Course: Microactuators [T-MACH-101910]

**Responsible:** Prof. Dr. Manfred Kohl  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101287 - Microsystem Technology

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**Competence Certificate**
written exam, 60 min.

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Microactuators**
2142881, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal]

**Description**

**Media:**
Script of ppt-slides

**Learning Content**
- Basic knowledge in the material science of the actuation principles
- Layout and design optimization
- Fabrication technologies
- Selected developments
- Applications

The lecture includes amongst others the following topics:

- Microelectromechanical systems: linear actuators, microrelais, micromotors
- Medical technology and life sciences: Microvalves, micropumps, microfluidic systems
- Microrobotics: Microgrippers, polymer actuators (smart muscle)
- Information technology: Optical switches, mirror systems, read/write heads

**Annotation**
Details will be announced at the beginning of the lecture

**Workload**
lecture time 1.5 h/week  
self preparation: 8.5 h/week

**Literature**
- Lecture notes
- M. Kohl, Shape Memory Microactuators, M. Kohl, Springer-Verlag Berlin, 2004
### 7.155 Course: Mobile Machines [T-MACH-105168]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101267 - Mobile Machines

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<th>Geimer, Geiger</th>
</tr>
</thead>
</table>

**Competence Certificate**

The assessment consists of an oral exam (45 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

none

**Recommendation**

Knowledge in Fluid Power Systems is required. It is recommended to attend the course Fluid Power Systems [2114093] beforehand.

**Annotation**

After completion of the course the students have knowledge of:

- a wide range of mobile machines
- operation modes and working cycles of important mobile machines
- selected subsystems and components

**Content:**

- Introduction of the required components and machines
- Basics and structure of mobile machines
- Practical insight in the development techniques

**Below you will find excerpts from events related to this course:**

**Mobile Machines**

2114073, SS 2019, 4 SWS, Language: Deutsch, [Open in study portal](#)

**Description**

**Media:**

Lecture notes.

**Learning Content**

- Introduction of the required components and machines
- Basics of the structure of the whole system
- Practical insight in the development techniques

**Workload**

- regular attendance: 42 hours
- self-study: 184 hours
7.156 Course: Mobility and Infrastructure [T-BGU-101791]

**Responsible:** Prof. Dr.-Ing. Ralf Roos  
Prof. Dr.-Ing. Peter Vortisch

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:** M-BGU-101067 - Mobility and Infrastructure

<table>
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<tr>
<td>SS 2019 6200404</td>
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<td>Spatial Planning and Planning Law</td>
<td>2 SWS</td>
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<td>Exercises to Spatial Planning and Planning Law</td>
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<td>SS 2019 6200406</td>
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<td>Transportation Systems</td>
<td>2 SWS</td>
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<td>Exercises to Transportation Systems</td>
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<td>SS 2019 6200408</td>
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<td>Design Basics in Highway Engineering</td>
<td>2 SWS</td>
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<tr>
<td>SS 2019 6200409</td>
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<td>Exercises to Design Basics in Highway Engineering</td>
<td>SWS</td>
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</table>

**Competence Certificate**
written exam, 150 min.

**Prerequisites**
None

**Recommendation**
For students from the KIT-Department of Economics and Management it is recommended to take part in the exercises.

**Annotation**
none
7.157 Course: Model Based Application Methods [T-MACH-102199]

**Responsible:** Dr. Frank Kirschbaum

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

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<td>Each summer term</td>
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**Competence Certificate**

take-home exam, short presentation with oral examination

**Prerequisites**

none
Course: Modeling and OR-Software: Introduction [T-WIWI-106199]

**Responsible:** Prof. Dr. Stefan Nickel

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101413 - Applications of Operations Research

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**Events**

| SS 2019 | 2550490 | Modellieren und OR-Software: Einführung | 3 SWS | Practical course (P) | Nickel, Bakker |

**Competence Certificate**
The assessment is a 120 minutes examination, including a written and a practical part (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the software laboratory and the following term.

**Prerequisites**
None

**Recommendation**

**Annotation**
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The lecture is offered in every term. The planned lectures and courses for the next three years are announced online.

Below you will find excerpts from events related to this course:

**Modellieren und OR-Software: Einführung**

2550490, SS 2019, 3 SWS, Language: Deutsch, [Open in study portal]

**Learning Content**
The task of solving combinatorial and nonlinear optimization problems imposes much higher requirements on suggested solution approaches as in linear programming.

During the course of this software laboratory, students get to know important methods from combinatorial optimization, e.g. Branch & Cut- or Column Generation methods and are enabled to solve problems with the software system IBM ILOG CPLEX Optimization Studio and the corresponding modeling language OPL. In addition, issues of nonlinear optimization, e.g. quadratic optimization, are addressed. As an important part of the software laboratory, students get the possibility to model combinatorial and nonlinear problems and implement solution approaches in the software system.

The software laboratory also introduces some of the most frequently used modelling and programming languages that are used in practice to solve optimization problems.

**Annotation**
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The lecture is held irregularly. The planned lectures and courses for the next three years are announced online.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.
### 7.159 Course: Modelling and Identification [T-ETIT-100699]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101156 - Control Engineering

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<th>Practice (Ü)</th>
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<tr>
<td>WS 19/20 2303166</td>
<td>2</td>
<td>Hohmann</td>
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<tr>
<td>WS 19/20 2303168</td>
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<td>Strehle</td>
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<tr>
<td>Modelling and Identification (Tutorial to 2303166)</td>
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**Prerequisites:** none
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<tr>
<th><strong>7.160 Course: Nanotechnology with Clusterbeams [T-MACH-102080]</strong></th>
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<tr>
<td><strong>Responsible:</strong> Dr. Jürgen Gspann</td>
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<tr>
<td><strong>Organisation:</strong> KIT Department of Mechanical Engineering</td>
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<td><strong>Part of:</strong> M-MACH-101287 - Microsystem Technology</td>
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<tbody>
<tr>
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</table>

**Competence Certificate**
written examination
presence in more that 70% of the lectures
Duration: 1 h

**Prerequisites**
none
7 COURSES

7.161 Course: Nonlinear Optimization I [T-WIWI-102724]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR
M-WIWI-103278 - Optimization under Uncertainty

Type: Written examination
Credits: 4.5
Recurrence: Each winter term
Version: 4

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<td>WS 19/20 2550112</td>
<td>Exercises Nonlinear Optimization I + II</td>
<td>SWS</td>
<td>Practice (Ü)</td>
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</table>

Competence Certificate
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.
The exam takes place in the semester of the lecture and in the following semester.
The examination can also be combined with the examination of Nonlinear Optimization II [2550113]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites
The module component exam T-WIWI-103637 "Nonlinear Optimization I and II" may not be selected.

Annotation
Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

V Nonlinear Optimization I
2550111, WS 19/20, 2 SWS, Open in study portal

Learning Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions for unconstrained problems
- Optimality conditions for unconstrained convex problems
- Numerical methods for unconstrained problems (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

Constrained problems are the contents of part II of the lecture.
The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Annotation
Part I and II of the lecture are held consecutively in the same semester.
Literature

Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
Course: Nonlinear Optimization I and II [T-WIWI-103637]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR

- Type: Written examination
- Credits: 9
- Recurrence: Each winter term
- Version: 5

Events

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<td>WS 19/20</td>
<td>2550112</td>
<td>Exercises Nonlinear Optimization I + II</td>
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<td>Practice (Ü)</td>
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<td>2550113</td>
<td>Nonlinear Optimization II</td>
<td>2</td>
<td>Lecture (V)</td>
<td>Stein</td>
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</table>

Competence Certificate
The assessment consists of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

The exam takes place in the semester of the lecture and in the following semester.

Prerequisites
None.

Annotation
Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

Nonlinear Optimization I
2550111, WS 19/20, 2 SWS, Open in study portal

Learning Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions for unconstrained problems
- Optimality conditions for unconstrained convex problems
- Numerical methods for unconstrained problems (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

Constrained problems are the contents of part II of the lecture.

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Annotation
Part I and II of the lecture are held consecutively in the same semester.

Literature
Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
Learning Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. Part I of the lecture treats unconstrained optimization problems. Part II of the lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions for constrained problems
- Optimality conditions for constrained convex problems
- Numerical methods for constrained problems (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Annotation
Part I and II of the lecture are held consecutively in the same semester.

Literature
Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
7 COURSES

Course: Nonlinear Optimization II [T-WIWI-102725]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR

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<th>Type</th>
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Events

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<th>Type</th>
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<td>WS 19/20</td>
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<tr>
<td></td>
<td>Nonlinear Optimization I + II</td>
<td>SWS</td>
<td>Stein</td>
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<tr>
<td>WS 19/20</td>
<td>Nonlinear Optimization II</td>
<td>2 SWS</td>
<td></td>
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</table>

Competence Certificate

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.
The exam takes place in the semester of the lecture and in the following semester.
The exam can also be combined with the examination of Nonlinear Optimization I [2550111]. In this case, the duration of the written exam takes 120 minutes.

Prerequisites

None.

Annotation

Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

Nonlinear Optimization II

2550113, WS 19/20, 2 SWS, Open in study portal

Learning Content

The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. Part I of the lecture treats unconstrained optimization problems. Part II of the lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions for constrained problems
- Optimality conditions for constrained convex problems
- Numerical methods for constrained problems (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Annotation

Part I and II of the lecture are held consecutively in the same semester.

Literature

Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
### 7.164 Course: Novel Actuators and Sensors [T-MACH-102152]

- **Responsible:** Prof. Dr. Manfred Kohl
  Dr. Martin Sommer

- **Organisation:** KIT Department of Mechanical Engineering

- **Part of:** M-MACH-101287 - Microsystem Technology

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<th>Events</th>
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<th>Version</th>
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</thead>
<tbody>
<tr>
<td>WS 19/20</td>
<td>4</td>
<td>Each winter term</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Competence Certificate
- written exam, 60 minutes

#### Prerequisites
- none

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**Below you will find excerpts from events related to this course:**

#### Novel actuators and sensors

- **2141865, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal**

**Description**

**Media:**
- Script / script of ppt foils (part 2)

**Learning Content**

- Basic knowledge in the material science of actuator and sensor principles
- Layout and design optimization
- Fabrication technologies
- Selected developments
- Applications

**Index:** The lecture includes amongst others the following topics:

- Piezo actuators
- Magnetostrictive actuators
- Shape memory actuators
- Electro-/magnetorheological actuators
- Sensors: Concepts, materials, fabrication
- Micromechanical sensors: Pressure, force, inertia sensors
- Temperature sensors
- Micro sensors for bio analytics
- Mechano-magnetic sensors

The lecture addresses students in the fields of mechanical engineering, mechatronics and information technology, materials science and engineering, electrical engineering and economic sciences. A comprehensive introduction is given in the basics and current developments on the macroscopic length scale.

The lecture is core subject of the major course "Actuators and Sensors" of the specialization "Mechatronics and Microsystems Technology" in Mechanical Engineering.
Workload

Work Lecture:
- time of attendance: 21 hours
- Self-study: 99 hours

Literature
- Lecture notes
- Donald J. Leo, Engineering Analysis of Smart Material Systems, John Wiley & Sons, Inc., 2007
7.165 Course: Operative CRM [T-WIWI-102597]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101422 - Specialization in Customer Relationship Management  
M-WIWI-101460 - CRM and Service Management

### Type | Credits | Recurrence | Version
--- | --- | --- | ---
Written examination | 4.5 | Each winter term | 1

#### Events

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<td>Übung Operatives CRM</td>
<td>1</td>
<td>Practice (Ü)</td>
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</table>

#### Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

#### Prerequisites

None

#### Recommendation

The attendance of courses Customer Relationship Management and Analytical CRM is advised.

*Below you will find excerpts from events related to this course:*

### Operative CRM

**2540522, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal**

#### Learning Content

The Student should be able to understand and implement methods and applications within the operative CRM. This includes, but is not limited to the analysis of business processes, as a basis for improvements in CRM, and applications like call centers.

#### Workload

The total workload for this course is approximately 135 hours (4.5 credits):

**Time of attendance**
- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

**Self-study**
- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m

**Sum:** 135h 00m
Literature

Elective literature:
7.166 Course: Optimization under Uncertainty [T-WIWI-106545]

**Responsible:** Prof. Dr. Steffen Rebennack

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101413 - Applications of Operations Research
M-WIWI-103278 - Optimization under Uncertainty

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<td>Lecture (V)</td>
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**Competence Certificate**
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

**Prerequisites**
None.
7 COURSES

7.167 Course: Optoelectronic Components [T-ETIT-101907]

Responsible: Prof. Dr. Wolfgang Freude
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-MACH-101287 - Microsystem Technology

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Prerequisites
none

**Responsible:** Prof. Dr. Petra Nieken

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101513 - Human Resources and Organizations
M-WIWI-101668 - Economic Policy I

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<td>Written examination</td>
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<td>Each summer term</td>
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**Events**

| SS 2019 | 2573001 | Personnel Policies and Labor Market Institutions | 2 SWS | Lecture (V) | Nieken |
| SS 2019 | 2573002 | Übungen zu Personalpolitik und Arbeitsmarktinstitutionen | 1 SWS | Practice (Ü) | Nieken, Mitarbeiter |

**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. In case of a small number of registrations, we might offer an oral exam instead of a written exam.

**Prerequisites**
None

**Recommendation**
Completion of module Business Administration is recommended.
Basic knowledge of microeconomics, game theory, and statistics is recommended.

Below you will find excerpts from events related to this course:

**Personnel Policies and Labor Market Institutions**
2573001, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Notes**
See Module Handbook
Course: PH APL-ING-TL01 [T-WIWI-106291]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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7.170 Course: PH APL-ING-TL02 [T-WIWI-106292]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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### 7.171 Course: PH APL-ING-TL03 [T-WIWI-106293]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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7.172 Course: PH APL-ING-TL04 ub [T-WIWI-106294]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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### 7.173 Course: PH APL-ING-TL05 ub [T-WIWI-106295]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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7.174 Course: PH APL-ING-TL06 ub [T-WIWI-106296]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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### 7.175 Course: PH APL-ING-TL07 [T-WIWI-108384]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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7.176 Course: Physical Basics of Laser Technology [T-MACH-102102]

Responsible: Dr.-Ing. Johannes Schneider
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101262 - Emphasis Materials Science

**Type** | **Credits** | **Recurrence** | **Version**
---|---|---|---
Oral examination | 5 | Each winter term | 3

**Events**

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<tr>
<th>Events</th>
<th>2181612</th>
<th>Physical basics of laser technology</th>
<th>3 SWS</th>
<th>Lecture / Practice (VÜ)</th>
<th>Schneider</th>
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</table>

**Competence Certificate**

oral examination (30 min)

no tools or reference materials

**Prerequisites**

It is not possible, to combine this brick with brick Laser Application in Automotive Engineering [T-MACH-105164] and brick Physical Basics of Laser Technology [T-MACH-109084]

**Recommendation**

Basic knowledge of physics, chemistry and material science

**Below you will find excerpts from events related to this course:**

**Physical basics of laser technology**

2181612, WS 19/20, 3 SWS, Language: Deutsch, [Open in study portal]

**Description**

**Media:**

lecture notes via ILIAS

**Learning Content**

Based on the description of the physical basics about the formation and the properties of laser light the lecture goes through the different types of laser beam sources used in industry these days. The lecture focuses on the usage of lasers especially in materials engineering. Other areas like measurement technology or medical applications are also mentioned. An excursion to the laser laboratory of the Institute for Applied Materials (IAM) will be offered.

- physical basics of laser technology
- laser beam sources (solid state, diode, gas, liquid and other lasers)
- beam properties, guiding and shaping
- lasers in materials processing
- lasers in measurement technology
- lasers for medical applications
- safety aspects

The lecture is complemented by a tutorial.

**Annotation**

It is allowed to select only one of the lectures "Laser in automotive engineering" (2182642) or "Physical basics of laser technology" (2181612) during the Bachelor and Master studies.

**Workload**

regular attendance: 33.5 hours
self-study: 116.5 hours
**Literature**
Course: Physics for Engineers [T-MACH-100530]

Responsible: Prof. Dr. Martin Dienwiebel  
Prof. Dr. Peter Gumbsch  
Prof. Dr. Alexander Nesterov-Müller  
Dr. Daniel Weygand

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101287 - Microsystem Technology

Events
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<td>Each summer term</td>
<td>1</td>
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</table>

Competence Certificate
written exam 90 min

Prerequisites
none

Below you will find excerpts from events related to this course:

Learning Content

1) Foundations of solid state physics
   - Wave particle dualism
   - Tunnelling
   - Schrödinger equation
   - H-atom

2) Electrical conductivity of solids
   - solid state: periodic potentials
   - Pauli Principle
   - band structure
   - metals, semiconductors and isolators
   - p-n junction / diode

3) Optics
   - quantum mechanical principles of the laser
   - linear optics
   - non-linear optics

Exercises (2142891, 2 SWS) are used for complementing and deepening the contents of the lecture as well as for answering more extensive questions raised by the students and for testing progress in learning of the topics.

Workload
regular attendance: 22.5 hours (lecture) and 22.5 hours (excerises 2142891)  
self-study: 97.5 hours and 49 hours (excerises 2142891)
Literature

- Tipler und Mosca: Physik für Wissenschaftler und Ingenieure, Elsevier, 2004
- Harris, Moderne Physik, Pearson Verlag, 2013
7.178 Course: Platform Economy [T-WIWI-109936]

**Responsible:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101421 - Supply Chain Management
- M-WIWI-101434 - eBusiness and Service Management

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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. Details of the grades will be announced at the beginning of the course.

**Prerequisites**
see below

**Recommendation**
None
7.179 Course: PLM for Product Development in Mechatronics [T-MACH-102181]

**Responsible:** Prof. Dr.-Ing. Martin Eigner

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Events**

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</table>

**Competence Certificate**

Oral examination 20 min.

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*  

**PLM for product development in mechatronics**

2122376, SS 2019, SWS, Language: Deutsch, [Open in study portal](#)

**Workload**

The total workload for this course is approximately 120 hours. For further information see German version.

**PLM for product development in mechatronics**

2122376, WS 19/20, SWS, Language: Deutsch, [Open in study portal](#)

**Workload**

The total workload for this course is approximately 120 hours. For further information see German version.
7.180 Course: PLM-CAD Workshop [T-MACH-102153]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Competence Certificate**
Alternative exam assessment (graded)

**Prerequisites**
None

**Annotation**
Number of participants is limited, compulsory attendance
7.181 Course: Polymer Engineering I [T-MACH-102137]

**Responsible:** Prof. Dr.-Ing. Peter Elsner
**Organisation:** KIT Department of Mechanical Engineering
**Part of:** M-MACH-101262 - Emphasis Materials Science

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**Type:** Oral examination  **Credits:** 4  **Recurrence:** Each winter term  **Version:** 1

**Competence Certificate**
Oral exam, about 25 minutes

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Polymer Engineering I**
2173590, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal]

**Notes**
1. Economical aspects of polymers
2. Introduction of mechanical, chemical and electrical properties
3. Processing of polymers (introduction)
4. Material science of polymers
5. Synthesis

**Learning objectives:**
The field of Polymer Engineering includes synthesis, material science, processing, construction, design, tool engineering, production technology, surface engineering and recycling. The aim is, to equip the students with knowledge and technical skills, and to use the material "polymer" meeting its requirements in an economical and ecological way.

The students
- are able to describe and classify polymers based on the fundamental synthesis processing techniques
- can find practical applications for state-of-the-art polymers and manufacturing technologies
- are able to apply the processing techniques, the application of polymers and polymer composites regarding to the basic principles of material science
- can describe the special mechanical, chemical and electrical properties of polymers and correlate these properties to the chemical bindings.
- can define application areas and the limitation in the use of polymers

**Requirements:**
none

**Workload:**
regular attendance: 21 hours
self-study: 99 hours
Learning Content
1. Economical aspects of polymers
2. Introduction of mechanical, chemical and electrical properties
3. Processing of polymers (introduction)
4. Material science of polymers
5. Synthesis

Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
Recommended literature and selected official lecture notes are provided in the lecture
Course: Polymer Engineering II [T-MACH-102138]

**Responsible:** Prof. Dr.-Ing. Peter Elsner

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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<th>Polymer Engineering II</th>
<th>2 SWS</th>
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**Competence Certificate**

Oral exam, about 25 minutes

**Prerequisites**

none

**Recommendation**

Knowledge in Polymerengineering I

Below you will find excerpts from events related to this course:

**Polymer Engineering II**

2174596, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

**Learning Content**

1. Processing of polymers
2. Properties of polymer components
   - Based on practical examples and components
   - 2.1 Selection of material
   - 2.2 Component design
   - 2.3 Tool engineering
   - 2.4 Production technology
   - 2.5 Surface engineering
   - 2.6 Sustainability, recycling

**Workload**

The workload for the lecture Polymerengineering II is 120 h per semester and consists of the presence during the lecture (21 h) as well as preparation and rework time at home (99 h).

**Literature**

Recommended literature and selected official lecture notes are provided in the lecture.
# 7.183 Course: Power Generation [T-ETIT-101924]

**Responsible:** Dr.-Ing. Bernd Hoferer  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101165 - Energy Generation and Network Components

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**Prerequisites**
none
Course: Power Network [T-ETIT-100830]

**Responsible:** Prof. Dr.-Ing. Thomas Leibfried

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-102379 - Power Network

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Industrial Engineering and Management B.Sc.
Module Handbook as of 23.08.2019
### 7.185 Course: Practical Seminar Digital Services [T-WIWI-105711]

| Responsible          | Prof. Dr. Gerhard Satzger  
|                      | Prof. Dr. Christof Weinhardt |
| Organisation         | KIT Department of Economics and Management |
| Part of              | M-WIWI-102752 - Fundamentals of Digital Service Systems |
| **Type**             | Examination of another type |
| **Credits**          | 4,5 |
| **Recurrence**       | Each summer term |
| **Version**          | 1 |

#### Competence Certificate
The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

#### Prerequisites
None

#### Recommendation
None

#### Annotation
The current range of seminar topics is announced on the KSRI website www.ksri.kit.edu.
Course: Practical Seminar Interaction [T-WIWI-109935]

**Responsible:** Prof. Dr. Alexander Mädche  
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-104911 - Information Systems & Digital Business: Interaction

---

**Type**  
Examination of another type

**Credits**  
4.5

**Recurrence**  
Each term

**Version**  
2

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**Competence Certificate**

The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class. Please take into account that, beside the written documentation, also a practical component (e.g. implementation of a prototype) is part of the course. Please examine the course description for the particular tasks. The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class). In the winter terms, the course is only offered as a seminar.

**Prerequisites**

None.
7.187 Course: Practical Seminar Platforms [T-WIWI-109937]

Responsible: Prof. Dr. Gerhard Satzger
                Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management

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Competence Certificate
The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class. Please take into account that, beside the written documentation, also a practical component (e.g. implementation of a prototype) is part of the course. Please examine the course description for the particular tasks. The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class). In the winter terms, the course is only offered as a seminar.

Prerequisites
None.
### 7.188 Course: Practical Seminar Servitization [T-WIWI-109939]

**Responsible:** Prof. Dr. Alexander Mädche  
Prof. Dr. Gerhard Satzger

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-104913 - Information Systems & Digital Business: Servitization

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**Competence Certificate**

The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class. Please take into account that, beside the written documentation, also a practical component (e.g. implementation of a prototype) is part of the course. Please examine the course description for the particular tasks. The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class). In the winter terms, the course is only offered as a seminar.

**Prerequisites**

None.
Course: Practical Training in Basics of Microsystem Technology [T-MACH-102164]

**Responsible:** Dr. Arndt Last  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

<table>
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<td>2 SWS</td>
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<td>SS 2019 2143877</td>
<td>Introduction to Microsystem Technology - Practical Course</td>
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**Competence Certificate**  
The assessment consists of a written exam

**Prerequisites**  
none

Below you will find excerpts from events related to this course:

**Introduction to Microsystem Technology - Practical Course**  
2143875, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**  
In the practical training includes nine experiments:
1. Hot embossing of plastics micro structures
2. Micro electroforming
3. Mikro optics: "LIGA-micro spectrometer"
4. UV-lithography
5. Optical waveguides
6. Capillary electrophoresis on a chip
7. SAW gas sensor
8. Metrology
9. Atomic force microscopy
Each student takes part in only five experiments.  
The experiments are carried out at real workstations at the IMT and coached by IMT-staff.

**Workload**  
Time of attendance: 21 h + 2 h exam  
Privat studies: 5 h preparing experiments + 10 h preparing the exam
Learning Content
In the practical training includes nine experiments:
1. Hot embossing of plastics micro structures
2. Micro electroforming
3. Mikro optics: "LIGA-micro spectrometer"
4. UV-lithography
5. Optical waveguides
6. Capillary electrophoresis on a chip
7. SAW gas sensor
8. Metrology
9. Atomic force microscopy
Each student takes part in only five experiments.
The experiments are carried out at real workstations at the IMT and coached by IMT-staff.

Workload
Time of attendance: 21 h + 2 h exam
Privat studies: 5 h preparing experiments + 10 h preparing the exam
7.190 Course: Problem Solving, Communication and Leadership [T-WIWI-102871]

**Responsible:**  Prof. Dr. Hagen Lindstädt  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101425 - Strategy and Organization  
- M-WIWI-101513 - Human Resources and Organizations

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**Competence Certificate**  
The assessment consists of a written exam (30 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**  
None

*Below you will find excerpts from events related to this course:*

**Problem solving, communication and leadership**  
2577910, SS 2019, 1 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**  
The course deals with various aspects of problem solving and communication processes and is divided into two parts. The first part of the course addresses the fundamental steps in the problem-solving process; namely, problem identification, problem structuring, problem analysis and communication of solution. Ideas for structuring problem solving processes will be discussed and the perquisites for and principles of structured communication based on charts and presentations will be explained. The second part of the course addresses important concepts in leadership, including the context-specificity of influence, the choice of leader and the characteristics of employees. The course content reflects current issues in management and communication practice and is oriented toward the practical application of theoretical insights to these issues. In this respect, the course aims to develop interdisciplinary skills.

**Workload**  
The total workload for this course is approximately 60 hours. For further information see German version.

**Literature**  
The relevant excerpts and additional sources are made known during the course.
7.191 Course: Procedures of Remote Sensing [T-BGU-103542]

Responsible: Dr.-Ing. Uwe Weidner
Organisation: KIT Department of Civil Engineering, Geo- and Environmental Sciences
Part of: M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
        M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
        M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**7.192 Course: Procedures of Remote Sensing, Prerequisite [T-BGU-101638]**

**Responsible:** Dr.-Ing. Uwe Weidner

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
# 7.193 Course: Process Fundamentals by the Example of Food Production [T-CIWVT-106058]

**Responsible:** Dr. Volker Gaukel  
**Organisation:** KIT Department of Chemical and Process Engineering  
**Part of:** M-WIWI-101839 - Additional Fundamentals of Engineering

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## Events

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## Prerequisites

none
### 7.194 Course: Product- and Production-Concepts for modern Automobiles [T-MACH-110318]

**Responsible:** Dr. Stefan Kienzle  
Dr. Dieter Steegmüller

**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101284 - Specialization in Production Engineering

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#### Competence Certificate

Oral Exam (20 min)

#### Prerequisites

T-MACH-105166 - Materials and Processes for Body Lightweight Construction in the Automotive Industry must not have been started.

*Below you will find excerpts from events related to this course:*

**Product- and Production-Concepts for modern Automobiles**  
2149670, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**

**Media:**

Lecture notes will be provided in Ilias ([https://ilias.studium.kit.edu/](https://ilias.studium.kit.edu/))
Notes
The lecture illuminates the practical challenges of modern automotive engineering. As former leaders of the automotive industry, the lecturers refer to current aspects of automotive product development and production.

The aim is to provide students with an overview of technological trends in the automotive industry. In this context, the course also focuses on changes in requirements due to new vehicle concepts, which may be caused by increased demands for individualisation, digitisation and sustainability. The challenges that arise in this context will be examined from both a production technology and product development perspective and will be illustrated with practical examples thanks to the many years of industrial experience of both lecturers.

The topics covered are:

- General conditions for vehicle and body development
- Integration of new drive technologies
- Functional requirements (crash safety etc.), also for electric vehicles
- Development Process at the Interface Product & Production, CAE/Simulation
- Energy storage and supply infrastructure
- Aluminium and lightweight steel construction
- FRP and hybrid parts
- Battery, fuel cell and electric motor production
- Joining technology in modern car bodies
- Modern factories and production processes, Industry 4.0.

Learning Outcomes:
The students ...

- are able to name the presented general conditions of vehicle development and are able to discuss their influences on the final product using practical examples.
- are able to name the various lightweight approaches and identify possible areas of application.
- are able to identify the different production processes for manufacturing lightweight structures and explain their functions.
- are able to perform a process selection based on the methods and their characteristics.

Workload:
regular attendance: 25 hours
self-study: 95 hours

Learning Content
The lecture illuminates the practical challenges of modern automotive engineering. As former leaders of the automotive industry, the lecturers refer to current aspects of automotive product development and production.

The aim is to provide students with an overview of technological trends in the automotive industry. In this context, the course also focuses on changes in requirements due to new vehicle concepts, which may be caused by increased demands for individualisation, digitisation and sustainability. The challenges that arise in this context will be examined from both a production technology and product development perspective and will be illustrated with practical examples thanks to the many years of industrial experience of both lecturers.

The topics covered are:

- General conditions for vehicle and body development
- Integration of new drive technologies
- Functional requirements (crash safety etc.), also for electric vehicles
- Development Process at the Interface Product & Production, CAE/Simulation
- Energy storage and supply infrastructure
- Aluminium and lightweight steel construction
- FRP and hybrid parts
- Battery, fuel cell and electric motor production
- Joining technology in modern car bodies
- Modern factories and production processes, Industry 4.0.

Workload
regular attendance: 25 hours
self-study: 95 hours
Course: Product Lifecycle Management [T-MACH-105147]

### Responsible
Prof. Dr.-Ing. Jivka Ovtcharova

### Organisation
KIT Department of Mechanical Engineering

### Part of
M-MACH-101270 - Product Lifecycle Management

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### Events

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### Competence Certificate
Written examination 90 min.

### Prerequisites
None

### Below you will find excerpts from events related to this course:

**Product Lifecycle Management**

| 2121350, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal |

**Lecture (V)**

### Learning Content
Product Lifecycle Management (PLM) is an approach to the holistic and cross-company management and control of all product-related processes and data throughout the life cycle along the extended supply chain - from design and production to sales, to the dismantling and recycling.

Product Lifecycle Management is a comprehensive approach for effective and efficient design of the product life cycle. Based on all product information, which comes up across the entire value chain and across multiple partners, processes, methods and tools are made available to provide the right information at the right time, quality and the right place.

The course covers:

- A consistent description of all business processes that occur during the product life cycle (development, production, sales, dismantling,...)
- the presentation of methods for the performance of the PLM business processes,
- explaining the most important corporate information systems to support the life cycle (PDM, ERP, SCM, CRM systems) to sample the software manufacturer SAP

### Workload
regular attendance: 42 hours
self-study: 128 hours
Literature
Lecture slides.


### Course: Product, Process and Resource Integration in the Automotive Industry [T-MACH-102155]

**Responsible:** Dr.-Ing. Sama Mbang  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Events**

| SS 2019 | 2123364 | Product, Process and Resource Integration in the Automotive Industry | 2 SWS | Lecture (V) | Mbang |

**Competence Certificate**  
Oral examination 20 min.

**Prerequisites**  
None

**Annotation**  
Limited number of participants.

---

Below you will find excerpts from events related to this course:

### Lecture (V)

**Product, Process and Resource Integration in the Automotive Industry**  
2123364, SS 2019, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**  
The lecture

- Overview of product development in the automotive sector (process- and work cycle, IT-Systems)
- Integrated product models in the automotive industry (product, process and resource)
- New CAx modeling methods (intelligent feature technology, templates & functional modeling)
- Automation and knowledge-based mechanism for product design and production planning
- Product development in accordance with defined process and requirement (3D-master principle, tolerance models)
- Concurrent Engineering, shared working
- Enhanced concepts: the digital and virtual factory (application of virtual technologies and methods in the product development)
- Systems: Siemens NX.

Additionally, a practical industrial project study is offered, which is based on an integrated application scenario (from design of production resources, over testing and validation method planning to the manufacturing and implementation of the production resources).

Since the student will be divided in small teams, this study will also teach the students about team work and distributed development.

**Annotation**  
Max. 20 students, registration necessary (ILIAS)

**Workload**  
regular attendance: 32 hours
self-study: 72 hours

**Literature**  
Lecture slides
7.197 Course: Production Economics and Sustainability [T-WIWI-102820]

**Responsible:** Dr. Jérémy Rimbon

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101437 - Industrial Production I

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**Competence Certificate**

The assessment consists of an oral (30 minutes) or a written (60 minutes) exam (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Below you will find excerpts from events related to this course:

**Production Economics and Sustainability**

2581960, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal](#)

**Type of Event:** Lecture (V)

**Learning Content**

The analysis and management of material flows on the company level and above will be the focus of this lecture. Herein, the discussion will be about cost-effective and environmentally acceptable steps to avoid, abate and recycle emissions and waste as well as ways of efficient resources handling. As methods material flow analysis (MFA), life cycle assessment (LCA) and OR methods, e.g. for decision support, are introduced.

**Topics:**
- regulations related to materials and substances
- raw materials, reserves and their availabilities/lifetimes
- material and substance flow analysis (MFA/SFA)
- material related ecoprofiles, e.g. Carbon Footprint
- LCA
- resource efficiency
- emission abatement
- waste management and closed-loop recycling
- raw material oriented production systems
- environmental management (EMAS, ISO 14001, Ecoprofit), eco-controlling

**Workload**

Total effort required will account for approximately 105h (3.5 credits).

**Literature**

will be announced in the course
Course: Project in Applied Remote Sensing [T-BGU-101814]

**Responsible:** Prof. Dr.-Ing. Stefan Hinz

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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7.199 Course: Project Management [T-BGU-101675]

- **Responsible:** Prof. Dr.-Ing. Shervin Haghsheno
- **Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences
- **Part of:** M-BGU-101004 - Fundamentals of Construction

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**Competence Certificate**

written exam with 60 minutes

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
7.200 Course: Project Workshop: Automotive Engineering [T-MACH-102156]

Responsible: Dr.-Ing. Michael Frey
Prof. Dr. Frank Gauterin
Dr.-Ing. Martin Gießler

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101264 - Handling Characteristics of Motor Vehicles
M-MACH-101265 - Vehicle Development
M-MACH-101266 - Automotive Engineering

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Competence Certificate
Oral examination
Duration: 30 up to 40 minutes
Auxiliary means: none

Prerequisites
none

Below you will find excerpts from events related to this course:

Project Workshop: Automotive Engineering
2115817, SS 2019, 3 SWS, Language: Deutsch, Open in study portal

Learning Content
During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop.

The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute.

At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.

Annotation
Selection procedure, applications are to submit in the end of the preceding semester.

Workload
regular attendance: 49 hours
self-study: 131 hours
The scripts will be supplied in the start-up meeting.

**Project Workshop: Automotive Engineering**

2115817, WS 19/20, 3 SWS, Language: Deutsch, [Open in study portal](#)

**Notes**
Limited number of participants with selection procedure, in German language. Please send the application at the end of the previous semester.
Date and room: see homepage of institute.

**Learning Content**
During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop.

The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute.

At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.

**Annotation**
Selection procedure, applications are to submit in the end of the preceding semester.

**Workload**
regular attendance: 49 hours
self-study: 131 hours

**Literature**

The scripts will be supplied in the start-up meeting.
### 7.201 Course: Public Law I - Basic Principles [T-INFO-101963]

**Responsible:** Prof. Dr. Nikolaus Marsch  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101187 - Elective Module Law

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### 7.202 Course: Public Law II - Public Business Law [T-INFO-102042]

**Responsible:** Prof. Dr. Nikolaus Marsch  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101187 - Elective Module Law

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382
Below you will find excerpts from events related to this course:

### Public Revenues

**2560120, SS 2019, 2 SWS, Language: Deutsch, Open in study portal**

**Description**
The Public Revenues lecture is concerned with the theory and policy of taxation and public dept. In the first chapter, fundamental concepts of taxation theory are introduced, whereas the second chapter deals with key elements of the German taxation system. The allocative and distributive effects of different taxation types are examined in chapter three and four. Chapter five integrates both allocative and distributive components in order to derive a theory of optimal taxation. The core of the sixth chapter is represented by international aspects of taxation. The debt part begins with a description of the extent and structure of public dept in chapter seven. In the following chapter, macroeconomic theories of national dept are evolved, while chapter nine is concerned with its long term consequences when employed as a regular instrument of budgeting. Finally, the tenth chapter deals with constitutional limits to public debt-incuring.

**Learning Content**
The Public Revenues lecture is concerned with the theory and policy of taxation and public dept. In the first chapter, fundamental concepts of taxation theory are introduced, whereas the second chapter deals with key elements of the German taxation system. The allocative and distributive effects of different taxation types are examined in chapter three and four. Chapter five integrates both allocative and distributive components in order to derive a theory of optimal taxation. The core of the sixth chapter is represented by international aspects of taxation. The debt part begins with a description of the extent and structure of public dept in chapter seven. In the following chapter, macroeconomic theories of national dept are evolved, while chapter nine is concerned with its long term consequences when employed as a regular instrument of budgeting. Finally, the tenth chapter deals with constitutional limits to public debt-incuring.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature

Elective literature:

7.204 Course: Public Sector Finance [T-WIWI-109590]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101403 - Public Finance

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Events
WS 19/20 | 2560136 | 3 SWS | Lecture (V) | Wigger, Groh

Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation SPO 2015.

Prerequisites
T-WIWI-107763 "Municipal Finance" must not be selected.

Annotation
Previous title until winter semester 2018/19 "Municipal Finance".

Below you will find excerpts from events related to this course:

2560136, WS 19/20, 3 SWS, Language: Deutsch, Open in study portal

Learning Content
The course Municipal Finance addresses the theory and policy of municipal revenues and spending including grants, municipal revenue equalisation, taxation as well as municipal and public enterprises.

At the beginning of the course, fundamental concepts of taxation theory as well as key elements of the German taxation system are introduced. The allocative and distributive effects of different taxation methods are examined thereafter and are combined within the theory of optimal taxation. The following chapter is concerned with municipal borrowing and illustrates ways to acquire additional funding. After addressing the extent, structure and variety of municipal borrowing, macroeconomic theories are introduced and applied to the municipal sector. In the course of this final chapter, special attention will be paid to the long term consequences and the sustainability of municipal borrowing as a means of budgeting.

Literature
- Several publications of the Ministry of Interior and the Ministry of Finance Baden-Württemberg.
### 7.205 Course: Python for Empirical Finance [T-WIWI-110217]

**Responsible:** Prof. Dr Maxim Ulrich  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-105035 - Empirical Finance

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<td>2500014</td>
<td>Python for Empirical Finance</td>
<td>2 SWS</td>
<td>Practical course (P)</td>
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#### Competence Certificate
The assessment is carried out in form of six biweekly Python programming tasks and offered each winter term. The grade of this course is determined by the points achieved in the programming tasks.

#### Prerequisites
None.

Below you will find excerpts from events related to this course:

### Python for Empirical Finance

**2500014, WS 19/20, 2 SWS, Language: Englisch, [Open in study portal](#)**  
**Practical course (P)**

#### Description
The aim of this course is to provide students with strong knowledge in Python to independently solve real-world data problems related to computational risk and asset management.

#### Learning Content
The course covers several topics from a programming perspective, among them:

- Mean-Variance Portfolio Optimization
- Modeling Distribution of Asset Returns with Factor Models and ARMA-GARCH
- Monte-Carlo Simulation
- Parameter Estimation with Maximum Likelihood and Regressions

#### Workload
The total workload for this course is approximately 90 hours.
7.206 Course: Quality Management [T-MACH-102107]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101284 - Specialization in Production Engineering

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Events

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<td>2149667</td>
<td>Quality Management</td>
<td>2 SWS</td>
<td>Lanza</td>
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</tbody>
</table>

Competence Certificate
Written Exam (60 min)

Prerequisites
none

Below you will find excerpts from events related to this course:

**Quality Management**
2149667, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal](https://ilias.studium.kit.edu/)

Description

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
Based on the quality philosophies Total Quality Management (TQM) and Six Sigma, the lecture deals with the requirements of modern quality management. Within this context, the process concept of a modern enterprise and the process-specific fields of application of quality assurance methods are presented. The lecture covers the current state of the art in preventive and non-preventive quality management methods in addition to manufacturing metrology, statistical methods and service related quality management. The content is completed with the presentation of certification possibilities and legal quality aspects.

Main topics of the lecture:
- The term "Quality"
- Total Quality Management (TQM) and Six Sigma
- Universal methods and tools
- QM during early product stages – product denition
- QM during product development and in procurement
- QM in production – manufacturing metrology
- QM in production – statistical methods
- QM in service
- Quality management systems
- Legal aspects of QM

Learning Outcomes:
The students ...
- are capable to comment on the content covered by the lecture.
- are capable of substantially quality philosophies.
- are able to apply the QM tools and methods they have learned about in the lecture to new problems from the context of the lecture.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about in the lecture for a specific problem.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Learning Content
Based on the quality philosophies Total Quality Management (TQM) and Six Sigma, the lecture deals with the requirements of modern quality management. Within this context, the process concept of a modern enterprise and the process-specific fields of application of quality assurance methods are presented. The lecture covers the current state of the art in preventive and non-preventive quality management methods in addition to manufacturing metrology, statistical methods and service related quality management. The content is completed with the presentation of certification possibilities and legal quality aspects.

Main topics of the lecture:
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- Universal methods and tools
- QM during early product stages – product denition
- QM during product development and in procurement
- QM in production – manufacturing metrology
- QM in production – statistical methods
- QM in service
- Quality management systems
- Legal aspects of QM

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours
# 7.207 Course: Rail System Technology [T-MACH-102143]

**Responsible:** Prof. Dr.-Ing. Peter Gratzfeld  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101274 - Rail System Technology

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<td>Rail System Technology</td>
<td>2</td>
<td>Lecture (V)</td>
<td>Gratzfeld</td>
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<tr>
<td>SS 2019</td>
<td>2115996</td>
<td>Rail Vehicle Technology</td>
<td>2</td>
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<td>Gratzfeld</td>
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<td>Lecture (V)</td>
<td>Gratzfeld</td>
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<td>Rail Vehicle Technology</td>
<td>2</td>
<td>Lecture (V)</td>
<td>Gratzfeld</td>
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</table>

**Competence Certificate**

Oral examination  
Duration: ca. 45 minutes  
No tools or reference materials may be used during the exam.

**Prerequisites**

Successful completion of the corresponding modules of the basic program.

Below you will find excerpts from events related to this course:

## Rail System Technology

**2115919, SS 2019, 2 SWS, Language: Deutsch, Open in study portal**

**Lecture (V)**

**Description**

**Media:**

All slides are available for download (Ilias-platform).

**Notes**

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact  
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling  
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram  
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return  
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles  
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control  
7. Traction power supply: power supply of rail vehicles, power networks, filling stations  
8. History (optional)
Learning Content

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, power networks, filling stations
8. History (optional)

Workload
Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature
A bibliography is available for download (Ilias-platform).

V Rail Vehicle Technology
2115996, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Description
Media:
All slides are available for download (Ilias-platform).

Notes
1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, interfaces
3. Bogies: forces, running gears, axle configuration
4. Drives: vehicle with/without contact wire, dual-mode vehicle
5. Brakes: tasks, basics, principles, blending, brake control
6. Train control management system: definitions, networks, bus systems, components, examples
7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons

Learning Content

1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, interfaces
3. Bogies: forces, running gears, axle configuration
4. Drives: vehicle with/without contact wire, dual-mode vehicle
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6. Train control management system: definitions, networks, bus systems, components, examples
7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons

Workload
Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature
A bibliography is available for download (Ilias-platform).

V Rail System Technology
2115919, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal
Description

Media:

All slides are available for download (Ilias-platform).

Notes

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, power networks, filling stations
8. History (optional)

Learning Content

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
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6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, power networks, filling stations
8. History (optional)

Workload

Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature

A bibliography is available for download (Ilias-platform).

Rail Vehicle Technology
2115996, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Notes

1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, interfaces
3. Bogies: forces, running gears, axle configuration
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Learning Content

1. Vehicle system technology: structure and main systems of rail vehicles
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5. Brakes: tasks, basics, principles, blending, brake control
6. Train control management system: definitions, networks, bus systems, components, examples
7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons
Workload
Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature
A bibliography is available for download (Ilias-platform).
7.208 Course: Real Estate Management I [T-WIWI-102744]

**Type**  Written examination  
**Credits**  4,5  
**Recurrence**  Each winter term  
**Version**  1

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<th>Recurrence</th>
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<td>WS 19/20</td>
<td>Übungen zu Real Estate Management I</td>
<td>2 SWS</td>
<td>Practice (Ü)</td>
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</table>

**Competence Certificate**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (winter semester). Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Annotation**
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

*Below you will find excerpts from events related to this course:*

**Real Estate Management I**

**Description**
The course Real Estate Management I deals with questions concerning the economy of a single building throughout its lifecycle. Among other topics this includes project development, location and market studies, German federal building codes as well as finance and assessment of economic efficiency.

The tutorial recesses the contents of the course by means of practical examples and, in addition to that, goes into the possible use of software tools.

**Learning Content**
The course Real Estate Management I deals with questions concerning the economy of a single building throughout its lifecycle. Among other topics this includes project development, location and market studies, German federal building codes as well as finance and assessment of economic efficiency.

The tutorial recesses the contents of the course by means of practical examples and, in addition to that, goes into the possible use of software tools.

**Annotation**
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

**Workload**
The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

**Elective literature:**
7.209 Course: Real Estate Management II [T-WIWI-102745]

Responsible: Prof. Dr.-Ing. Thomas Lützkendorf
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101466 - Real Estate Management

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (summer semester). Reexaminations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
A combination with the module Design Construction and Assessment of Green Buildings I is recommended. Furthermore it is recommended to choose courses of the following fields

- Finance and Banking
- Insurance
- Civil Engineering and Architecture (building physics, structural design, facility management)

Annotation
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

Below you will find excerpts from events related to this course:

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<td>Worschech</td>
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</table>

Description
The course Real Estate Management II gives special attention to topics in connection to the management of large real estate portfolios. This especially includes property valuation, market and object rating, maintenance and modernization, as well as real estate portfolio and risk management. The tutorial provides examples in order to practice the application of theoretical knowledge to practical problems.

Notes
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

Learning Content
The course Real Estate Management II gives special attention to topics in connection to the management of large real estate portfolios. This especially includes property valuation, market and object rating, maintenance and modernization, as well as real estate portfolio and risk management. The tutorial provides examples in order to practice the application of theoretical knowledge to practical problems.

Annotation
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature
Elective literature:
See german version.
7.210 Course: Remote Sensing, Exam [T-BGU-101636]

Responsible: Prof. Dr.-Ing. Stefan Hinz
Organisation: KIT Department of Civil Engineering, Geo- and Environmental Sciences
Part of: M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

Type: Oral examination
Credits: 4
Recurrence: Each summer term
Version: 1

Events

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<td>6020242</td>
<td>Fernerkundungssysteme, Übung</td>
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Recommendation
None

**Responsible:** PD Dr. Patrick Jochem
Prof. Dr. Russell McKenna

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101464 - Energy Economics

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**Events**

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<td>Each winter term</td>
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</table>

**Competence Certificate**

The assessment consists of a written exam (60 min., in English, answers in English or German) according to § 4 paragraph 2 Nr. 1 of the examination regulation SPO2015.

**Prerequisites**

None.

**Below you will find excerpts from events related to this course:**

**Learning Content**

1. General introduction: Motivation, Global situation
2. Basics of renewable energies: Energy balance of the earth, potential definition
3. Hydro
4. Wind
5. Solar
6. Biomass
7. Geothermal
8. Other renewable energies
9. Promotion of renewable energies
10. Interactions in systemic context
11. Excursion to the "Energieberg" in Mühlburg

**Workload**

The total workload for this course is approximately 105.0 hours. For further information see German version.

**Literature**

Elective literature:

7.212 Course: Selected Topics on Optics and Microoptics for Mechanical Engineers [T-MACH-102165]

 Responsible: Dr.-Ing. Timo Mappes
 Organisation: KIT Department of Mechanical Engineering

 Part of: M-MACH-101287 - Microsystem Technology

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<td>1</td>
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Competence Certificate
Oral examination

Prerequisites
none
## 7.213 Course: Seminar Data-Mining in Production [T-MACH-108737]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-WIWI-101816 - Seminar Module

### Type
- Examination of another type  
- Credits: 3  
- Recurrence: Each term  
- Version: 1

### Events

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<td>Seminar Data Mining in Production</td>
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<td>Seminar ($)</td>
<td>Lanza</td>
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### Competence Certificate
- alternative test achievement (graded):
  - written elaboration (workload of at least 80 h)  
  - oral presentation (approx. 30 min)

### Prerequisites
- none

### Annotation
The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at [https://www.wbk.kit.edu/studium-und-lehre.php](https://www.wbk.kit.edu/studium-und-lehre.php).

Below you will find excerpts from events related to this course:

### Seminar Data Mining in Production

**Description**

**Media:**  
KNIME Analytics Platform
Notes
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

Learning Outcomes:
The students ...
- can name, describe and distinguish between different methods, procedures and techniques of production data analysis.
- can perform basic data analyses with the data mining tool KNIME.
- can analyze and evaluate the results of data analyses in the production environment.
- are able to derive suitable recommendations for action.
- are able to explain and apply the CRISP-DM model.

Workload:
regular attendance: 10 hours
self-study: 80 hours

Learning Content
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

Annotation
The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Workload
regular attendance: 10 hours
self-study: 80 hours

Seminar Data Mining in Production
2151643, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Description
Media:
KNIME Analytics Platform
Notes
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

Learning Outcomes:
The students ...  
- can name, describe and distinguish between different methods, procedures and techniques of production data analysis.
- can perform basic data analyses with the data mining tool KNIME.
- can analyze and evaluate the results of data analyses in the production environment.
- are able to derive suitable recommendations for action.
- are able to explain and apply the CRISP-DM model.

Workload:
regular attendance: 10 hours  
self-study: 80 hours

Learning Content
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

Annotation
The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Workload
regular attendance: 10 hours  
self-study: 80 hours
### Course: Seminar in Business Administration (Bachelor) [T-WIWI-103486]

**Responsible:** Professorenschaft des Fachbereichs Betriebswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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### Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

### Prerequisites
None.

### Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

### Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

**Seminar in Finance (Master, Prof. Uhrig-Homburg)**
2530580, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

**Learning Content**
Within this seminar different topics of current concern are treated. These topics have their foundations in the contents of certain lectures.

The topics of the seminar are published on the website of the involved finance chairs at the end of the foregoing semester.

**Workload**
The total workload for this course is approximately 90 hours. For further information see German version.

**Literature**
Will be announced at the end of the foregoing semester.

**Seminar Human Resources and Organizations (Bachelor)**
2573010, SS 2019, 2 SWS, Open in study portal

**Notes**
See Module Handbook

**Seminar Human Resource Management (Bachelor)**
2573011, SS 2019, 2 SWS, Open in study portal

**Notes**
See Module Handbook
Seminar Management Accounting
2579904, SS 2019, 2 SWS, Language: Englisch, Open in study portal

Notes
see Module Handbook

Learning Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify ( provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Annotation
Maximum of 24 students.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Special Topics in Management Accounting
2579905, SS 2019, 2 SWS, Language: Englisch, Open in study portal

Notes
see Module Handbook

Learning Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify ( provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Annotation
Maximum of 24 students.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Seminar in Empirical Finance
2500028, WS 19/20, 2 SWS, Language: Englisch, Open in study portal

Description
The aim of this seminar is to introduce the student to empirical data work in financial economics and investments.
Bachelor Seminar aus Data Science
2540524, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Workload
The total workload for this course is approximately 90 hours (3 credits):

Time of attendance
- Introductory lessons: 4 x 90min = 6h 00m
- Presentations: 4 x 90min = 6h 00m

Selbststudium
- Preparing the presentation: 8h
- Literature research: 40h
- Writing the seminar paper: 30h

Summe: 90h 00m

Literature
Elective literature:

Entrepreneurship Basics (Track 2)
2545011, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Annotation
Please register on the seminar website.

Seminar: Human Resources and Organizations (Bachelor)
2573010, WS 19/20, 2 SWS, , Open in study portal

Notes
See Module Handbook

Seminar: Human Resource Management (Bachelor)
2573011, WS 19/20, 2 SWS, , Open in study portal

Notes
See Module Handbook

Seminar Management Accounting - Special Topics
2579919, WS 19/20, 2 SWS, Language: Englisch, Open in study portal

Notes
see Module Handbook

Learning Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in four to five meetings that are spread throughout the semester.

Annotation
Maximum of 24 students.
Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.
7.215 Course: Seminar in Economics (Bachelor) [T-WIWI-103487]

**Responsible:** Professorenschaft des Fachbereichs Volkswirtschaftslehre

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101816 - Seminar Module

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<td>2561208</td>
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**Competence Certificate**
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**
None.

**Recommendation**
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

_Below you will find excerpts from events related to this course:_

**Topics in Political Economics (Bachelor)**
2560553, SS 2019, 2 SWS, Language: Englisch, Open in study portal
Description
In many companies relative reward schemes are used whereby employees earn a bonus if they perform better than their colleagues. Moreover, hierarchical structures mean that in many organizations, employees find themselves in constant competition for promotions. This is meant to provide incentives for higher performance. However, competitive remuneration schemes could also have detrimental effects such that individual workers may view their colleagues as direct competitors generating more selfish and/or less helpful behavior in the workplace. Furthermore, age, gender and culture seem to have impacts on willingness to compete. For example, in western cultures, adult men sometimes enter competition even though their performance level is way too low for success, i.e., they harm themselves by over-competitiveness. In contrast, adult females sometimes compete less than they could do successfully.

Another challenge in contest design, e.g., in sports, is that when competition takes place among workers with mixed abilities it may lead to a discouragement effect, which establishes that lower ability individuals often reduce effort competing against an individual they do not feel up to (e.g. it has been found that average golf players performed significantly worse when competing against a superstar like Tiger Woods). One solution suggested by the economic literature is to level the playing field between advantaged and disadvantaged individuals by favoring weaker individuals through bid-caps, asymmetric tie-breaking rules, or advances. In sports, asymmetric tie-breaking is already common, for instance, in the Champions League soccer playoffs “away goals” become the decisive factor in determining the winning team in case of a tie.

Contests are not only a well-established mechanism for incentivizing workers but also for encouraging innovation and advancing R&D. Elements of research and innovation contests can be found in the procurement of various goods and services. For instance, the construction of new buildings, proposals in a venture capital firm or TV shows for entertainment companies all flow through a similar innovation process that involves the solicitation of bids from multiple potential suppliers and the preparation of a pilot or a proposal. In other cases, e.g., in lobbying contests, it is often discussed whether investments are beneficial or not. Some authors have argued that investments into lobbying should be capped in order to soften competition among asymmetrically strong interest groups (e.g. the lobbying industry versus consumers’ interest groups). Of course, then the question arises whether such caps achieve the respective design goal or not.

In this seminar, we discuss questions like: How can we design workplaces and labor contracts to increase motivation and productivity? How can contests be used to foster innovation? Which role should social preferences play and how could they inspire specific contest designs? How should sport contests be engineered depending on the respective goals? How should we design lobbying contests?

Also related topics are very welcome!

Notes
Participation will be limited to 12 students.

Annotation
For further questions, please contact Patrick Maus (Patrick.Maus@kit.edu).

Workload
About 90 hours

Literature
Annotation
For further questions, please contact David Huber (david.huber@kit.edu).

Workload
About 90 hours.

Topics in Econometrics
2521310, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Annotation
In the winter semester 2018/19 the course will be held in English.

Topics on Political Economics (Bachelor)
2560140, WS 19/20, 2 SWS, Language: Englisch, Open in study portal

Workload
About 90 hours.

Topics on Political Economics (Master)
2560142, WS 19/20, 2 SWS, Language: Englisch, Open in study portal

Workload
About 90 hours.
### 7.216 Course: Seminar in Engineering Science Master (approval) [T-WIWI-108763]

**Responsible:** Fachvertreter ingenieurwissenschaftlicher Fakultäten  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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**Competence Certificate**  
See German version.

**Prerequisites**  
See module description.

**Recommendation**  
None
### 7.217 Course: Seminar in Informatics (Bachelor) [T-WIWI-103485]

**Responsible:** Professorenschaft des Fachbereichs Informatik  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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</table>

**Competence Certificate**  
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:
- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**  
None.

**Recommendation**  
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)
Annotation
Placeholder for seminars offered by the Institute AIFB. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required. The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

Knowledge Discovery and Data Mining
2512300, SS 2019, 3 SWS, Language: Englisch, Open in study portal

Description
The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Notes
The exact dates and information for registration will be announced at the event page.

Learning Content
Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

Literature
Detailed references are indicated together with the respective subjects. For general background information look up the following textbooks:

- Mitchell, T.; Machine Learning

Data Science & Real-time Big Data Analytics
2513306, SS 2019, 2 SWS, Language: Deutsch/Englisch, Open in study portal

Description
Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Seminar Service Science, Management & Engineering
2595470, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Learning Content
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.

See the KSRI website for more information about this seminar: www.ksri.kit.edu

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
The student will receive the necessary literature for his research topic.
**Linked Data and the Semantic Web**

2512301, WS 19/20, 3 SWS, Language: Deutsch/Englisch, [Open in study portal](#)

**Description**

The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as 'Block-Seminar'.

**Notes**

The exact dates and information for registration will be announced at the event page.

**Learning Content**

Topics of interest include, but are not limited to:

- Travel Security
- Geo data
- Linked News
- Social Media

**Real-World Challenges in Data Science and Analytics**

2512311, WS 19/20, 3 SWS, Language: Deutsch/Englisch, [Open in study portal](#)

**Notes**

The exact dates and information for registration will be announced at the event page.

**Seminar Service Science, Management & Engineering**

2595470, WS 19/20, 3 SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**

Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.

See the KSRI website for more information about this seminar: www.ksri.kit.edu

**Workload**

The total workload for this course is approximately 90 hours. For further information see German version.

**Literature**

The student will receive the necessary literature for his research topic.
7.218 Course: Seminar in Mathematics (Bachelor) [T-MATH-102265]

**Responsible:** Dr. Martin Folkers
Prof. Dr. Günter Last

**Organisation:** KIT Department of Mathematics

**Part of:** M-WIWI-101816 - Seminar Module

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</table>
### Course: Seminar in Operations Research (Bachelor) [T-WIWI-103488]

**Responsible:** Prof. Dr. Stefan Nickel  
Prof. Dr. Steffen Rebennack  
Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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**Events**

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<tr>
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<td>2550132</td>
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<td>SS 2019</td>
<td>2550472</td>
<td>Seminar on Power Systems Optimization (Bachelor)</td>
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<td>SS 2019</td>
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<td>Seminar zur diskreten Optimierung</td>
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<td>2550131</td>
<td>Seminar zu Methodischen Grundlagen des Operations Research</td>
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<td>WS 19/20</td>
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<td>Seminar: Modern OR and Innovative Logistics</td>
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</table>

**Competence Certificate**

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**

None.

**Recommendation**

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

**Seminar zur diskreten Optimierung**

2550491, SS 2019, SWS, Language: Deutsch, [Open in study portal](#)

**Learning Content**

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.
Annotation
The seminar is offered in each term.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.

Seminar zu Methodischen Grundlagen des Operations Research
2550131, WS 19/20, SWS, Language: Deutsch, [Open in study portal]

Learning Content
The current seminar topics are announced under http://kop.ior.kit.edu at the end of the preceding semester.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
References and relevant sources are announced at the beginning of the seminar.

Seminar: Modern OR and Innovative Logistics
2550491, WS 19/20, 2 SWS, Language: Deutsch, [Open in study portal]

Learning Content
The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.

Annotation
The seminar is offered in each term.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.
### 7.220 Course: Seminar in Statistics (Bachelor) [T-WIWI-103489]

**Responsible:** Prof. Dr. Oliver Grothe  
Prof. Dr. Melanie Schienle  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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<td>Topics in Econometrics</td>
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<td>Schienle, Chen, Görgen</td>
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**Competence Certificate**

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**

None.

**Recommendation**

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

**Below you will find excerpts from events related to this course:**

#### Topics in Econometrics

2521310, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

**Annotation**

In the winter semester 2018/19 the course will be held in English.
7.221 Course: Seminar Production Technology [T-MACH-109062]

Responsible:
Prof. Dr.-Ing. Jürgen Fleischer
Prof. Dr.-Ing. Gisela Lanza
Prof. Dr.-Ing. Volker Schulze

Organisation:
KIT Department of Mechanical Engineering

Part of:
M-WIWI-101816 - Seminar Module

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<td>1 SWS</td>
<td>Seminar (S)</td>
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Competence Certificate
alternative test achievement (graded):
- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

Prerequisites
none

Annotation
The specific topics are published on the homepage of the wbk Institute of Production Science.

Below you will find excerpts from events related to this course:

Description
The specific topics are published on the homepage of the wbk Institute of Production Science.

Notes
In course of the seminar Production Technology current issues of the wbk main fields of research "Manufacturing and Materials Technology", "Machines, Equipment and Process Automation" as well as "Production Systems" are discussed.

The specific topics are published on the homepage of the wbk Institute of Production Science.

Learning Outcomes:
The students ...
- are in a position to independently handle current, research-based tasks according to scientific criteria.
- are able to research, analyze, abstract and critically review the information.
- can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- can logically and systematically present the obtained results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

Workload:
regular attendance: 10 hours
self-study: 80 hours
Learning Content
In course of the seminar Production Technology current issues of the wbk main fields of research "Manufacturing and Materials Technology", "Machines, Equipment and Process Automation" as well as "Production Systems" are discussed.

Workload
regular attendance: 10 hours
self-study: 80 hours
### 7.222 Course: Seminar: Legal Studies I [T-INFO-101997]

- **Responsible:** Prof. Dr. Thomas Dreier
- **Organisation:** KIT Department of Informatics
- **Part of:** M-WIWI-101816 - Seminar Module

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**Events**

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<td>SS 2019</td>
<td>2400061</td>
<td>Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
<td>Bless, Boehm, Hartenstein, Mädche, Sunyaev, Zitterbart</td>
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<tr>
<td>SS 2019</td>
<td>24820</td>
<td>Current Issues in Patent Law</td>
<td>2 SWS</td>
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<td>WS 19/20</td>
<td>24389</td>
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<td>2 SWS</td>
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Below you will find excerpts from events related to this course:

**Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung**

2400061, SS 2019, 2 SWS, [Open in study portal](https://portal.wiwi.kit.edu/ys/2708)

**Notes**

Registration via [https://portal.wiwi.kit.edu/ys/2708](https://portal.wiwi.kit.edu/ys/2708)
7.223 Course: Services Marketing and B2B Marketing [T-WIWI-102806]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101424 - Foundations of Marketing

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Events

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<td>WS 19/20</td>
<td>2572158</td>
<td>Services Marketing and B2B Marketing</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
<td>Klarmann</td>
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</table>

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Annotation
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Below you will find excerpts from events related to this course:

Services Marketing and B2B Marketing
2572158, WS 19/20, 2 SWS, Language: Deutsch, Open in study portal

Learning Content
The aim of this course is to prepare students for two certain marketing perspectives. The service marketing is concentrated on the particularities coming up when a company sells services instead of products. Subjects in this section are for example:

- Measuring service quality
- Pricing services
- Management of service staff

The second part of the course contains a business-to-business marketing perspective. Topics are below others:

- Management of buying centers
- Competitive Bidding
- B2B-Branding

Annotation
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Workload
The total workload for this course is approximately 90 hours.

Literature
### 7.224 Course: Simulation of Coupled Systems [T-MACH-105172]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer  
Yusheng Xiang  

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101265 - Vehicle Development  
M-MACH-101267 - Mobile Machines

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<td>2114095</td>
<td>Simulation of Coupled Systems</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
<td>Geimer, Xiang</td>
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</table>

**Competence Certificate**  
The assessment consists of an oral exam (20 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at very ordinary examination date.

A registration is mandatory, the details will be announced on the webpages of the Institute of Vehicle System Technology / Institute of Mobile Machines. In case of too many applications, attendance will be granted based on pre-qualification.

**Prerequisites**  
Required for the participation in the examination is the preparation of a report during the semester. The partial service with the code T-MACH-108888 must have been passed.

**Recommendation**

- Knowledge of ProE (ideally in actual version)
- Basic knowledge of Matlab/Simulink
- Basic knowledge of dynamics of machines
- Basic knowledge of hydraulics

**Annotation**  
After completion of course, students are able to:

- build a coupled simulation  
- parametrize models  
- perform simulations  
- conduct troubleshooting  
- check results for plausibility

The number of participants is limited.

**Content:**

- Basics of multi-body and hydraulics simulation programs  
- Possibilities of coupled simulations  
- Modelling and Simulation of Mobile Machines using a wheel loader  
- Documentation of the result in a short report

**Literature:**

- Software guide books (PDFs)  
- Information about wheel-type loader specifications

*Below you will find excerpts from events related to this course:*
Simulation of Coupled Systems
2114095, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

Learning Content
- Knowledge of the basics of multi-body and hydraulic simulation programs
- Possibilities of coupled simulations
- Development of a simulation model by using the example of a wheel loader
- Documentation of the result in a short report

Workload
- regular attendance: 21 hours
- total self-study: 92 hours

Literature
Elective literature:
- miscellaneous guides according the software-tools pdf-shaped
- information to the wheel-type loader
### Course: Simulation of Coupled Systems - Advance [T-MACH-108888]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer  
Yusheng Xiang  

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101265 - Vehicle Development  
M-MACH-101267 - Mobile Machines

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**Competence Certificate**  
Preparation of semester report

**Prerequisites**  
none
### 7.226 Course: Social Science A (WiWi) [T-GEISTSOZ-109048]

**Responsible:** Prof. Dr. Gerd Nollmann  
**Organisation:** KIT Department of Humanities and Social Sciences  
**Part of:** M-GEISTSOZ-101167 - Sociology/Empirical Social Research

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<td>SS 2019 5011013</td>
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<td>SS 2019 5011019</td>
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## 7.227 Course: Social Science B (WiWi) [T-GEISTSOZ-109049]

**Responsible:** Prof. Dr. Gerd Nollmann  
**Organisation:** KIT Department of Humanities and Social Sciences  
**Part of:** M-GEISTSOZ-101167 - Sociology/Empirical Social Research

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### 7.228 Course: Special Topics in Information Systems [T-WIWI-109940]

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<th>Prof. Dr. Christof Weinhardt</th>
</tr>
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<td><strong>Organisation:</strong></td>
<td>KIT Department of Economics and Management</td>
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<tr>
<td><strong>Part of:</strong></td>
<td>M-WIWI-101434 - eBusiness and Service Management</td>
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**Competence Certificate**

The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.

Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class).

**Prerequisites**
see below

**Recommendation**
None

**Annotation**

All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Systems course. The current topics of the practical seminars are available at the following homepage: www.iism.kit.edu/im/lehre

The Special Topics Information Systems is equivalent to the practical seminar, as it was only offered for the major in "Information Management and Engineering" so far. With this course students majoring in "Industrial Engineering and Management" and "Economics Engineering" also have the chance of getting practical experience and enhance their scientific capabilities.

The Special Topics Information Systems can be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.
Course: Statistical Modeling of Generalized Regression Models [T-WIWI-103065]

**Responsible:** Dr. Wolf-Dieter Heller

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101599 - Statistics and Econometrics

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**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation.

**Prerequisites**
None

**Recommendation**
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016]

Below you will find excerpts from events related to this course:

**Statistische Modellierung von Allgemeinen Regressionsmodellen**

**Annotation**
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016]

**Workload**
The total workload for this course is approximately 135 hours (4.5 credits).
- regular attendance: 30 hours
- self-study: 65 hours
- exam preparation: 40 hours
7.230 Course: Statistics I [T-WIWI-102737]

Responsible: Prof. Dr. Oliver Grothe
Prof. Dr. Melanie Schienle

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101432 - Introduction to Statistics

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<td>2</td>
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Competence Certificate
The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation.

The exam takes place at the end of the lecture period or at the beginning of the recess period. The re-examination takes place in the following semester.

Prerequisites
None

Below you will find excerpts from events related to this course:

Statistics I
2600008, SS 2019, 4 SWS, Language: Deutsch, Open in study portal

Learning Content
A. Descriptive Statistics: univariate and bivariate analysis
B. Probability Theory: probability space, conditional and product probabilities
C. Random variables: location and shape parameters, dependency measures, concrete distribution models

Workload
150 hours (5.0 Credits).

Literature
Skriptum: Kurzfassung Statistik I

Elective literature:
7.231 Course: Statistics II [T-WIWI-102738]

**Responsible:** Prof. Dr. Oliver Grothe  
Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101432 - Introduction to Statistics

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**Events**

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<td>Statistics II</td>
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<td>WS 19/20</td>
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<td>Tutorien zu Statistik II</td>
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**Competence Certificate**

The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation.

The exam takes place at the end of the lecture period or at the beginning of the recess period. The re-examination takes place in the following semester.

**Prerequisites**

None

**Recommendation**

It is recommended to attend the course Statistics I [2600008] before the course Statistics II [2610020].

*Below you will find excerpts from events related to this course:*

**Statistics II**

2610020, WS 19/20, 4 SWS, Language: Deutsch, Open in study portal

**Learning Content**

D. Sampling and Estimation Theory: Sampling distributions, estimators, point and interval estimation  
E. Test Theory: General Principles of Hypothesis Testing, Concrete 1- and 2-Sampling Tests  
F. Regression analysis: Simple and multiple linear regression, statistical inference

**Workload**

150 hours (5.0 Credits).

**Literature**

Script: Kurzfassung Statistik II  
Elective literature:  
Course: Strategic Finance and Technology Change [T-WIWI-110511]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101423 - Topics in Finance II
          M-WIWI-101465 - Topics in Finance I

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Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The exam is offered each semester. If there are only a small number of participants registered for the exam, we reserve the right to hold an oral examination instead of a written one.

Prerequisites
None

Recommendation
Attending the lecture "Financial Management" is strongly recommended.
7.233 Course: Structural and Phase Analysis [T-MACH-102170]

**Responsible:** Dr.-Ing. Susanne Wagner

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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**Competence Certificate**
Oral examination

**Prerequisites**
none
7.234 Course: Structural Ceramics [T-MACH-102179]

Responsible: Prof. Dr. Michael Hoffmann
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101262 - Emphasis Materials Science

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Events

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</table>

Competence Certificate
Oral examination, 20 min

Prerequisites
none

Below you will find excerpts from events related to this course:

V Structural Ceramics
2126775, SS 2019, 2 SWS, Language: Deutsch, Open in study portal Lecture (V)

Description
Media:
Slides for the lecture:
available under http://www.iam.kit.edu/km

Learning Content
The lecture gives an overview on structure and properties of the technical relevant structural ceramics silicon nitride, silicon carbide, alumina, zirconia, boron nitride and fibre-reinforced ceramics. All types of structural ceramics will be discussed in detail in terms of preparation methods of the raw materials, shaping techniques, densification, microstructural development, mechanical properties and application fields.

Annotation
The course will not take place every year.

Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
### 7.235 Course: System Dynamics and Control Engineering [T-ETIT-101921]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101156 - Control Engineering

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<td>2303157</td>
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</table>

**Prerequisites**

none
7.236 Course: Systematic Materials Selection [T-MACH-100531]

**Responsible:** Dr.-Ing. Stefan Dietrich

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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**Competence Certificate**
The assessment is carried out as a written exam of 2 h.

**Prerequisites**
The two courses "Materials Science I" (T-MACH-102078) and "Materials Science II" (T-MACH-102079) must be passed.

**Recommendation**
Basic knowledge in materials science, mechanics and mechanical design due to the lecture Materials Science I/II.

*Below you will find excerpts from events related to this course:*

**Systematic Materials Selection**

**2174576, SS 2019, 3 SWS, Language: Deutsch, Open in study portal**

**Lecture (V)**

**Learning Content**
Important aspects and criteria of materials selection are examined and guidelines for a systematic approach to materials selection are developed. The following topics are covered:

- Information and introduction
- Necessary basics of materials
- Selected methods / approaches of the material selection
- Examples for material indices and materials property charts
- Trade-off and shape factors
- Sandwich materials and composite materials
- High temperature alloys
- Regard of process influences
- Material selection for production lines
- Incorrect material selection and the resulting consequences
- Abstract and possibility to ask questions

**Workload**
The workload for the lecture is 120 h per semester and consists of the presence during the lecture (30 h) as well as preparation and rework time at home (30 h) and preparation time for the oral exam (60 h).

**Literature**
Lecture notes; Problem sheets; Textbook: M.F. Ashby, A. Wanner (Hrsg.), C. Fleck (Hrsg.); Materials Selection in Mechanical Design: Das Original mit Übersetzungshilfen Easy-Reading-Ausgabe, 3. Aufl., Spektrum Akademischer Verlag, 2006
ISBN: 3-8274-1762-7
7.237 Course: Systems of Remote Sensing, Prerequisite [T-BGU-101637]

**Responsible:** Prof. Dr.-Ing. Stefan Hinz

**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
7.238 Course: Tactical and Operational Supply Chain Management [T-WIWI-102714]

**Responsible:** Prof. Dr. Stefan Nickel

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101413 - Applications of Operations Research
- M-WIWI-101421 - Supply Chain Management
- M-WIWI-103278 - Optimization under Uncertainty

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**Competence Certificate**
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

**Prerequisite**
Prerequisite for admission to examination is the succesful completion of the online assessments.

**Prerequisites**
Prerequisite for admission to examination is the succesful completion of the online assessments.

**Recommendation**
None

**Annotation**
The lecture is held in every summer term. The planned lectures and courses for the next three years are announced online.

*Below you will find excerpts from events related to this course:

**Taktisches und operatives SCM**

2550486, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

**Description**
Since the classical work 'Theory of the Location of Industries' of Weber from 1909, the determination of an optimal location of a new facility with respect to existing customers is strongly connected to strategical logistics planning. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of supply chains. Thoroughly carried out, location planning allows an efficient flow of materials and leads to lower costs and increased customer service.

Subject of the course is an introduction to the most important terms and definitions in location planning as well as the presentation of basic quantitative location planning models. Furthermore, specialized location planning models for Supply Chain Management will be addressed as they are part in many commercial SCM tools for strategic planning tasks.

**Learning Content**
The lecture covers basic quantitative methods in location planning in the context of strategic Supply Chain Planning. Besides the discussion of several criteria for the evaluation of the locations of facilities, the students are acquainted with classical location planning models (planar models, network models and discrete models) and advanced location planning models designed for Supply Chain Management (single-period and multi-period models). The exercises accompanying the lecture offer the possibility to apply the considered models to practical problems.

**Annotation**
The lecture is held in every summer term. The planned lectures and courses for the next three years are announced online.
Literature

Elective Literature

- Love, Morris, Wesolowsky: Facilities Location: Models and Methods, North Holland, 1988
### 7.239 Course: Technical Conditions Met [T-WIWI-106623]

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101599 - Statistics and Econometrics

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**Competence Certificate**  
This module element is intended to record the Bachelor-examination "Introduction to Game Theory”. In the master module M-WIWI-101453 "Applied Strategic Decisions", this means that the obligatory course "Advanced Game Theory” is not required.

**Prerequisites**  
None
Course: Tires and Wheel Development for Passenger Cars [T-MACH-102207]

Responsible: Dr.-Ing. Günter Leister
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101265 - Vehicle Development

Type: Oral examination
Credits: 3
Recurrence: Each summer term
Version: 1

Events
| SS 2019 | 2114845 | Tires and Wheel Development for Passenger Cars | 2 SWS | Lecture (V) | Leister |

Competence Certificate
Oral Examination

Duration: 30 up to 40 minutes

Auxiliary means: none

Prerequisites
none

Below you will find excerpts from events related to this course:

Learning Content
1. The role of the tires and wheels in a vehicle
2. Geometrie of Wheel and tire, Package, load capacity and endurance, Book of requirement
3. Mobility strategy, Minispare, runflat systems and repair kit.
4. Project management: Costs, weight, planning, documentation
5. Tire testing and tire properties
6. Wheel technology including Design and manufacturing methods, Wheel testing
7. Tire pressure: Indirect and direct measuring systems
8. Tire testing subjective and objective

Workload
regular attendance: 22.5 hours
self-study: 97.5 hours

Literature
Manuscript to the lecture
### Course: Vehicle Comfort and Acoustics I [T-MACH-105154]

**Responsible:** Prof. Dr. Frank Gauterin  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

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**Competence Certificate**  
Oral Examination  
Duration: 30 up to 40 minutes  
Auxiliary means: none

**Prerequisites**  
Can not be combined with lecture T-MACH-102206

*Below you will find excerpts from events related to this course:*

#### Vehicle Ride Comfort & Acoustics I  
2114856, SS 2019, 2 SWS, Language: Englisch, Open in study portal  
**Lecture (V)**

**Notes**  
In English language.

**Learning Content**  
1. Perception of noise and vibrations  
3. Fundamentals of acoustics and vibrations  
3. Tools and methods for measurement, computing, simulation and analysis of noise and vibrations  
4. The relevance of tire and chassis for the acoustic and mechanical driving comfort: phenomena, influencing parameters, types of construction, optimization of components and systems, conflict of goals, methods of development  
An excursion will give insights in the development practice of a car manufacturer or a system supplier.

**Workload**  
regular attendance: 22.5 hours  
self-study: 97.5 hours

**Literature**  
2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006  

The script will be supplied in the lectures.
Learning Content
1. Perception of noise and vibrations

3. Fundamentals of acoustics and vibrations

3. Tools and methods for measurement, computing, simulation and analysis of noise and vibrations

4. The relevance of tire and chasis for the acoustic and mechanical driving comfort: phenomena, influencing parameters, types of construction, optimization of components and systems, conflict of goals, methods of development

An excursion will give insights in the development practice of a car manufacturer or a system supplier.

Workload
regular attendance: 22.5 hours
self-study: 97.5 hours

Literature

2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006


The script will be supplied in the lectures
7.242 Course: Vehicle Comfort and Acoustics II [T-MACH-105155]

**Responsible:** Prof. Dr. Frank Gauterin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

<table>
<thead>
<tr>
<th>Events</th>
<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
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<tr>
<td>SS 2019 2114825 Vehicle Comfort and Acoustics II 2 SWS Lecture (V) Gauterin</td>
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<tr>
<td>SS 2019 2114857 Vehicle Ride Comfort &amp; Acoustics II 2 SWS Lecture (V) Gauterin</td>
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</table>

**Competence Certificate**

Oral Examination

Duration: 30 up to 40 minutes

Auxiliary means: none

**Prerequisites**

Can not be combined with lecture T-MACH-102205

Below you will find excerpts from events related to this course:

**Vehicle Comfort and Acoustics II**

2114825, SS 2019, 2 SWS, Language: Deutsch, Open in study portal

**Learning Content**

1. Summary of the fundamentals of acoustics and vibrations

2. The relevance of road surface, wheel imperfections, springs, dampers, brakes, bearings and bushings, suspensions, engines and drive train for the acoustic and mechanical driving comfort:
   - phenomena
   - influencing parameters
   - types of construction
   - optimization of components and systems
   - conflicts of goals
   - methods of development

3. Noise emission of motor vehicles
   - noise stress
   - sound sources and influencing parameters
   - legal restraints
   - optimization of components and systems
   - conflict of goals
   - methods of development

**Workload**

regular attendance: 22.5 hours
self-study: 97.5 hours

**Literature**

The script will be supplied in the lectures.
Vehicle Ride Comfort & Acoustics II

2114857, SS 2019, 2 SWS, Language: Englisch, Open in study portal

Notes
The lecture starts in June 2016. Exact date of beginning: see homepage of institute.

In English language.

Learning Content
1. Summary of the fundamentals of acoustics and vibrations

2. The relevance of road surface, wheel imperfections, springs, dampers, brakes, bearings and bushings, suspensions, engines and drive train for the acoustic and mechanical driving comfort:
   - phenomena
   - influencing parameters
   - types of construction
   - optimization of components and systems
   - conflicts of goals
   - methods of development

3. Noise emission of motor vehicles
   - noise stress
   - sound sources and influencing parameters
   - legal restraints
   - optimization of components and systems
   - conflict of goals
   - methods of development

Workload
regular attendance: 22,5 hours
self-study: 97,5 hours

Literature
The script will be supplied in the lectures.
### 7.243 Course: Vehicle Mechatronics I [T-MACH-105156]

<table>
<thead>
<tr>
<th>Responsible</th>
<th>Prof. Dr.-Ing. Dieter Ammon</th>
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<tbody>
<tr>
<td>Organisation</td>
<td>KIT Department of Mechanical Engineering</td>
</tr>
<tr>
<td>Part of</td>
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<td>M-MACH-101265 - Vehicle Development</td>
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<td>Credits</td>
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<td>Recurrence</td>
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</table>

**Competence Certificate**

Written examination

**Duration:** 90 minutes

**Auxiliary means:** none

**Prerequisites**

none
## 7.244 Course: Virtual Reality Practical Course [T-MACH-102149]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101270 - Product Lifecycle Management

<table>
<thead>
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<th>Type</th>
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<td>Each term</td>
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### Events

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<th>Instructor</th>
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<tr>
<td>WS 19/20</td>
<td>2123375</td>
<td>Virtual Reality Practical Course</td>
<td>3</td>
<td>Ovtcharova, Mitarbeiter</td>
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</table>

**Competence Certificate**  
Assessment of another type (graded)

**Prerequisites**  
None

**Annotation**  
Number of participants is limited

*Below you will find excerpts from events related to this course:*

### Virtual Reality Practical Course

2123375, WS 19/20, 3 SWS, Language: Deutsch/Englisch, [Open in study portal](#)  

**Project (PRO)**

### Learning Content

The lab course consists of:

1. Introduction and basics in virtual reality (hardware, software, application)  
2. Introduction in 3DVIA Virtools tool kit as an application development system  
3. Implementation and practice by developing a driving simulator in small groups.
7.245 Course: Visual Computing [T-WIWI-110108]

**Responsible:** Dr. Tatiana Landesberger von Antburg  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101399 - Emphasis Informatics  
M-WIWI-101426 - Electives in Informatics

<table>
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**Events**

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<td>Visual Computing</td>
<td>Lecture (V)</td>
<td>2 SWS</td>
<td>Landesberger von Antburg</td>
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<td>SS 2019</td>
<td>2500009</td>
<td>Exercise Visual Computing</td>
<td>Practice (Ü)</td>
<td>1 SWS</td>
<td>Landesberger von Antburg</td>
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</table>

**Competence Certificate**

The examination is offered for first writers only in the summer semester 2019. The repeat exam will take place in the winter semester 2019/2020 (only for “repeaters”).

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (30 min) following §4, Abs. 2, 2 of the examination regulation.

**Prerequisites**

None.

**Annotation**

The lecture will be offered once in the summer semester 2019.

*Below you will find excerpts from events related to this course:*

**Visual Computing**

2500005, SS 2019, 2 SWS, [Open in study portal](#)  
Lecture (V)

**Learning Content**

The lecture will provide basic knowledge about various aspects of visual computing - visualization of data, and processing of visual information. Course content will have application context of business, transport and business. Content will include data visualization of business and operational data (2D, 3D and multivariate data, time series, networks) perceptual aspects, visual design, color design, interaction, as well as basics of image processing and object recognition.

**Workload**

Total effort for 5 credit points: approx. 150 hours.

**Literature**

Literature recommendations are regularly updated and include, for example:


**Exercise Visual Computing**

2500009, SS 2019, 1 SWS, [Open in study portal](#)  
Practice (Ü)

**Notes**

Please note that the exercise does not begin until the second week of lectures.
7.246 Course: Welfare Economics [T-WIWI-102610]

**Responsible:** Prof. Dr. Clemens Puppe  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101501 - Economic Theory

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**Events**

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<td>2520517</td>
<td>Welfare Economics</td>
<td>SWS</td>
<td>Lecture (V)</td>
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<td>SS 2019</td>
<td>2520518</td>
<td>Übung zur Wohlfahrtstheorie</td>
<td>SWS</td>
<td>Practice (Ü)</td>
<td>Puppe, Rollmann</td>
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</table>

**Competence Certificate**
The assessment consists of a written exam at the end of the semester (according to Section 4 (2), 1 or 2 of the examination regulation).

**Prerequisites**
The courses Economics I: Microeconomics [2610012] and Economics II: Macroeconomics [2600014] have to be completed beforehand.

**Recommendation**
None

*Below you will find excerpts from events related to this course:*

### Welfare Economics

**2520517, SS 2019, SWS, Language: Deutsch, Open in study portal**

**Lecture (V)**

**Learning Content**
The lecture "Welfare economics" deals with the question of efficiency and distributional properties of economic allocations, in particular allocations of market equilibria. The lecture is based on the two welfare theorems: The first welfare theorem (under weak preconditions) says that every competitive equilibrium is efficient.

According to the second welfare theorem (under stronger preconditions), every efficient allocation can be preserved as a competitive equilibrium through adequate choices of initial endowments. Afterwards, the terms and definitions of envy-freeness and the related concept of egalitarian equivalence in the context of the general theory of equilibrium will be discussed.

The second part of the lecture deals with the principle of "social justice" (i.e. distributational justice). The fundamental principles of utilitarianism, Rawl's theory of justice as well as John Roemer's theory of equality of opportunity are explained and critically analyzed.

**Annotation**
The course will be held every two years in the summer.

**Workload**
The total workload for this course is approximately 135 hours. For further information see German version.

**Literature**

**Elective literature:**
### 7.247 Course: Wildcard eBusiness and Service Management [T-WIWI-109808]

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<tbody>
<tr>
<td>Part of:</td>
<td>M-WIWI-101434 - eBusiness and Service Management</td>
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<tbody>
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<td>Examination of another type</td>
<td>4,5</td>
<td>1</td>
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</table>
7.248 Course: Wildcard Supply Chain Management [T-WIWI-109802]

Organisation: University
Part of: M-WIWI-101421 - Supply Chain Management

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<tbody>
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</table>
7.249 Course: Wildcard Supply Chain Management [T-WIWI-109803]

Organisation: University
Part of: M-WIWI-101421 - Supply Chain Management

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